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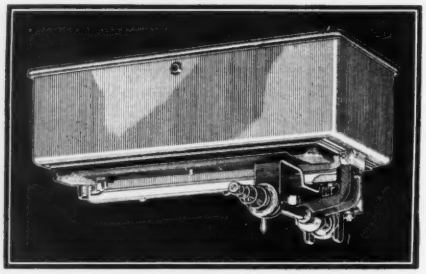

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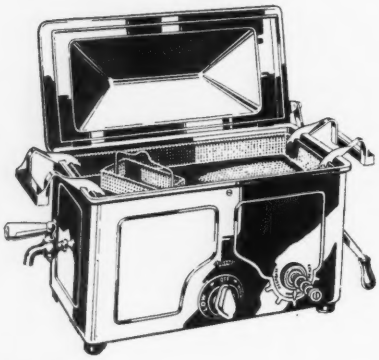

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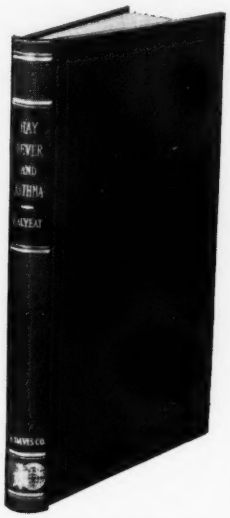

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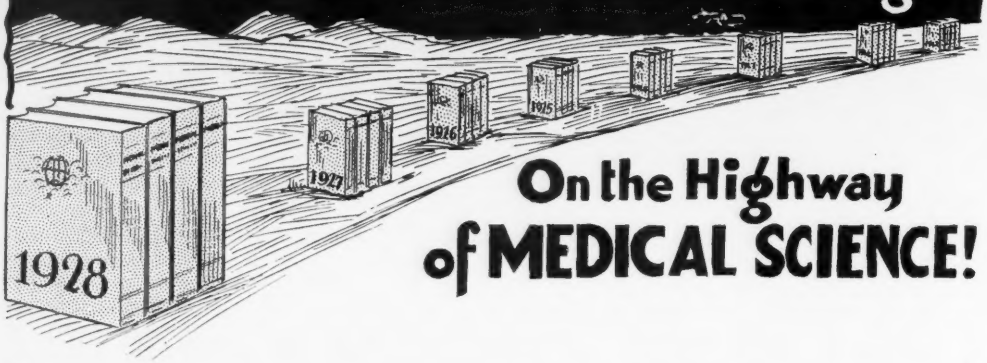

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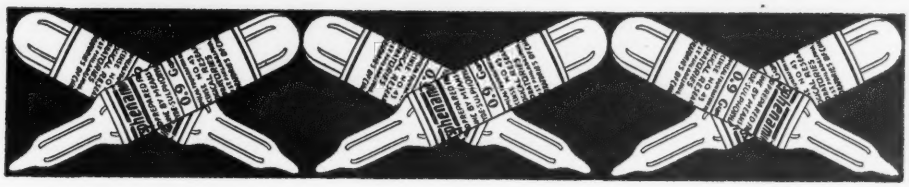

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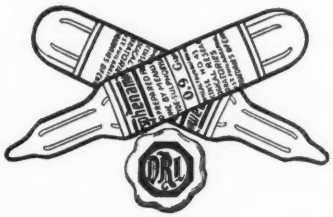

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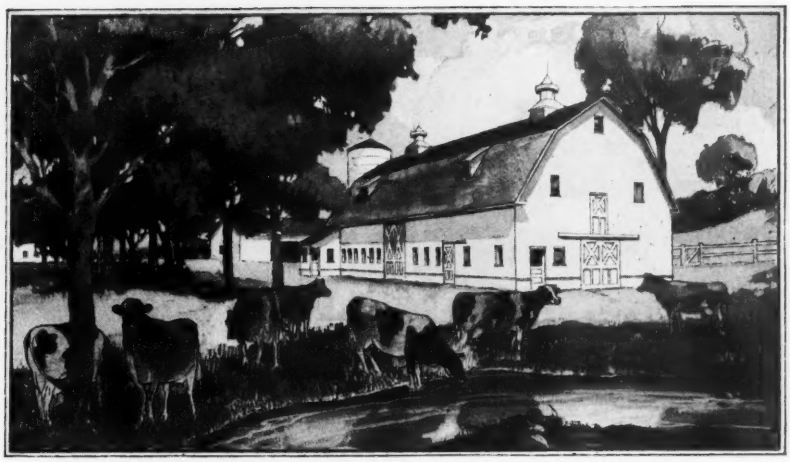

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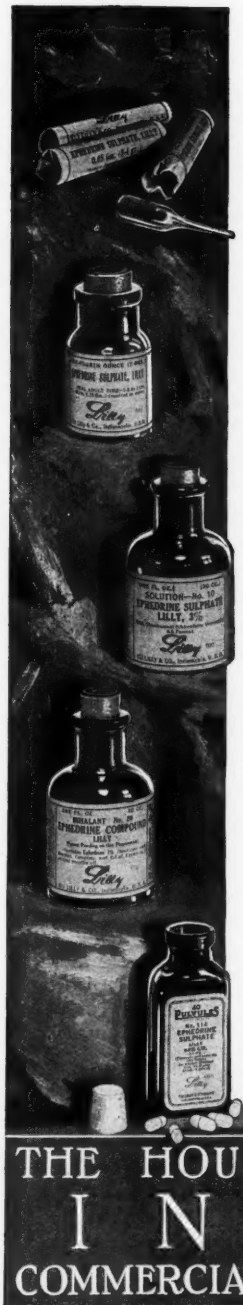

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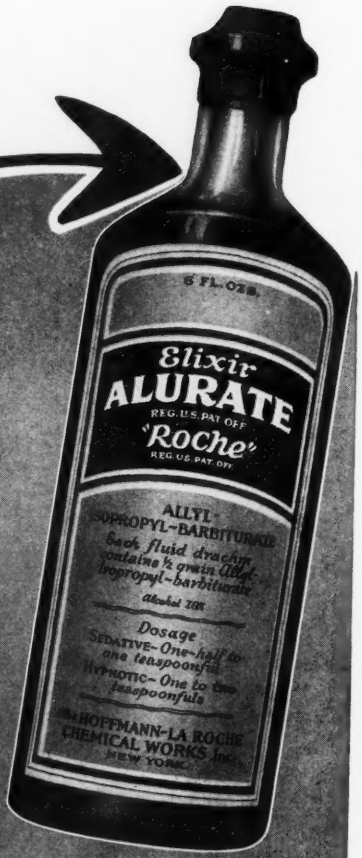

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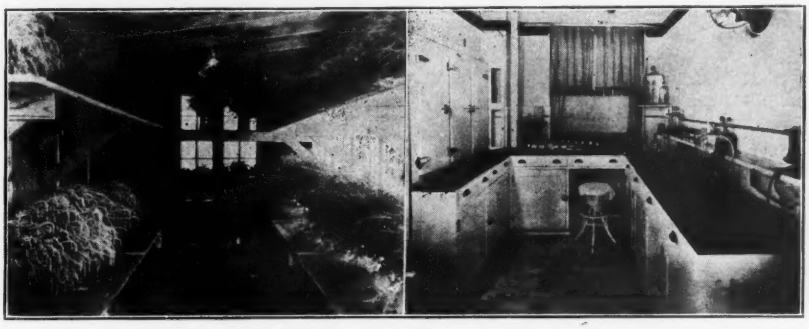

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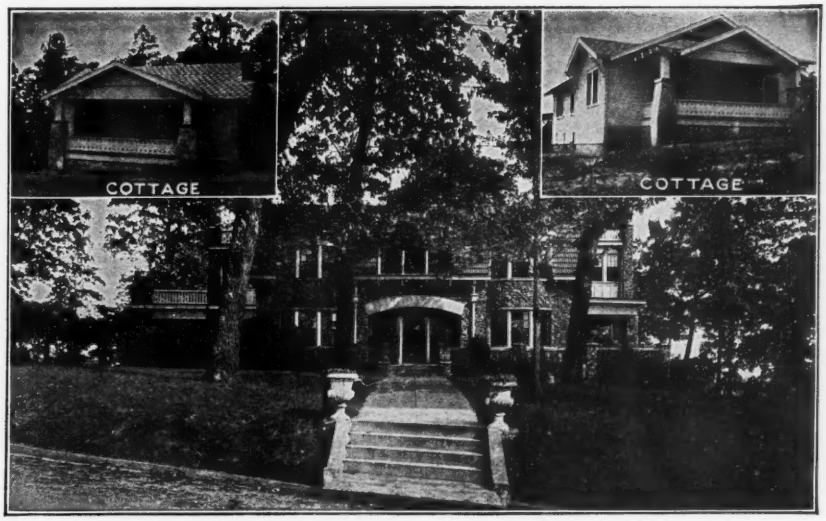

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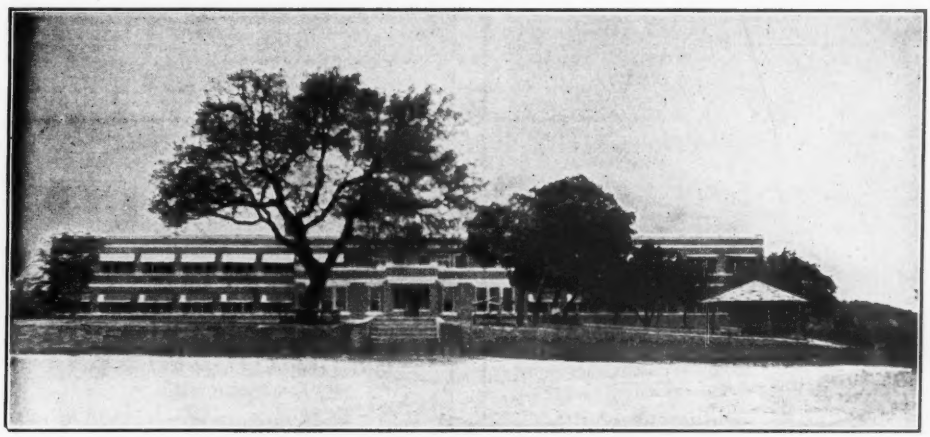

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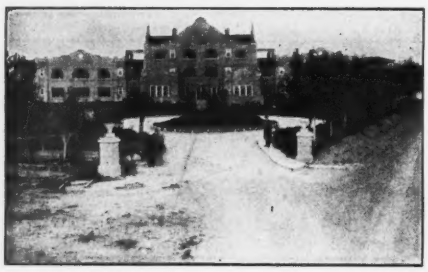

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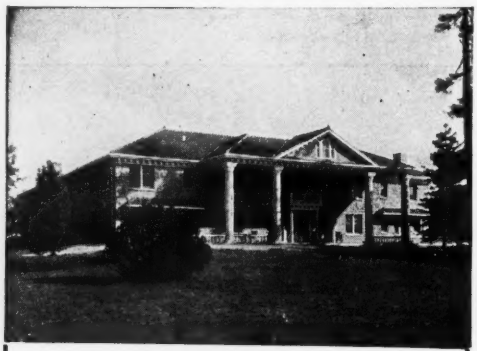

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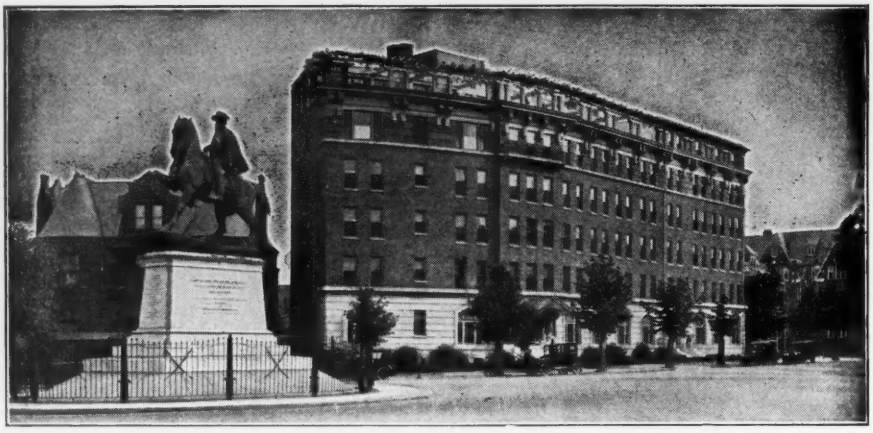

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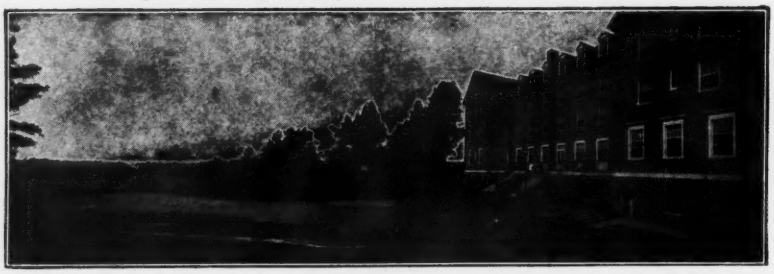

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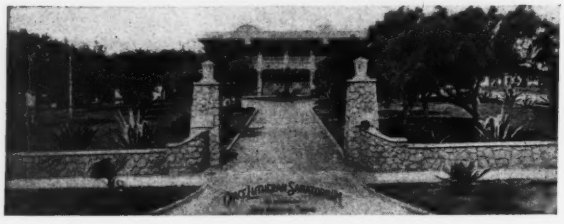

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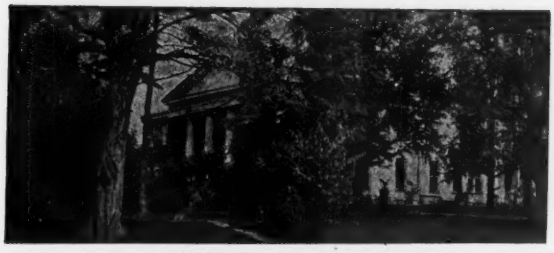

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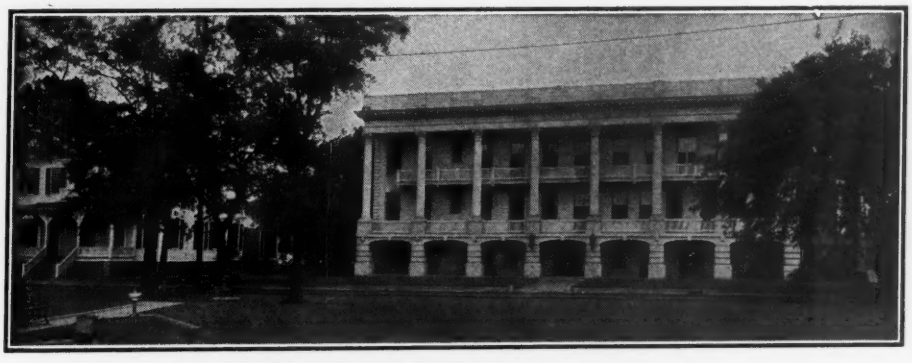

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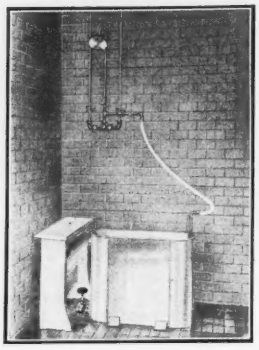

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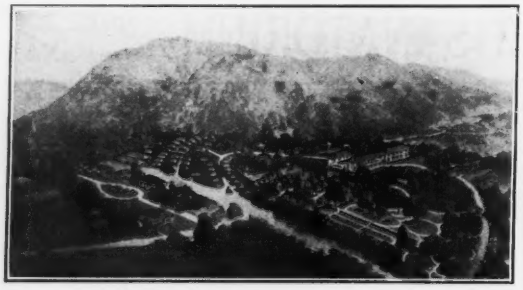

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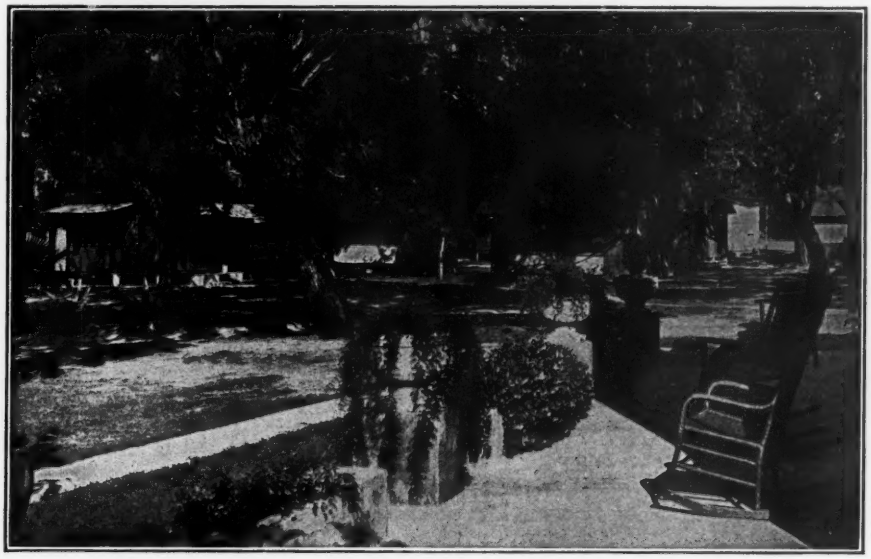

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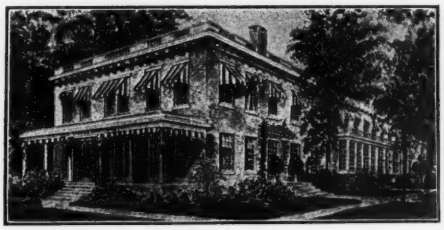

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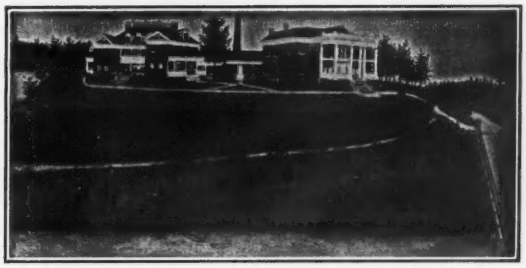

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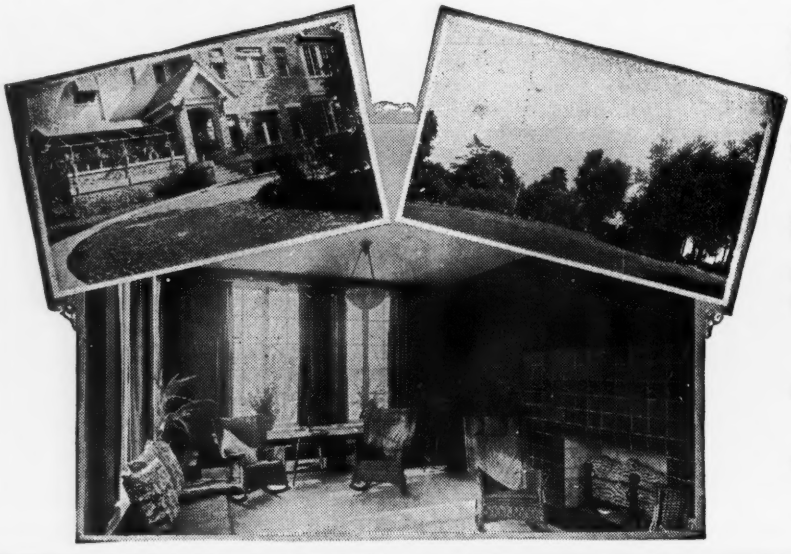

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Volume XXI JULY 1928 Number 7

THE MANAGEMENT OF UTERINE MALIGNANCIES AT THE RADIUM INSTITUTE OF THE UNIVERSITY OF PARIS*†

By GEORGE T. PACK, B.S., M.D.
Tuscaloosa, Ala.

The purpose of this paper is to serve as an American echo by reporting the technical details and principles involved in the management of uterine malignancies at the Radium Institute, together with certain personal observations, impressions and comments.

(I) THE UTERO-VAGINAL APPLICATION OF RADIUM

(a) PRELIMINARY MEASURES

Histologic Analysis.—Insomuch as all treatment is based upon the histological diagnosis of the cancer, a biopsy is performed upon every tumor, as soon as the patient presents herself at the clinic. This determines the variety of the cancer, contributes to the prognostic evaluation of the tumor and influences the choice of the methods of treatment. Regaud explains that although biopsy is truly dangerous in certain closed cancers such as cancer of the breast, sarcoma and others, it carries insignificant hazards in cancer of the uterine cervix. In those instances where the clinical diagnosis is uncertain, biopsy furnishes decisive proof. To obtain the biopsy specimen in some instances it may be necessary to explore the cervical canal with a curette.

Bacteriologic Analysis.—At the initial visit of the patient, a culture of the vaginal and cervical bacterial flora is made. A douche of the vagina twice daily with an antiseptic solution is prescribed until the day of treatment. The putrefactive microbes disappear readily under this local treatment, but the pyogens, namely the staphylococcus and streptococcus, are more difficult to destroy. Autogenous vaccines are responded to by the staphylococci, but the streptococci, particularly those of the dangerous hemolytic type, are very resistant. In every instance where internal radium therapy has been followed by severe pelvic infection, the preceding bacteriologic analysis has demonstrated the presence of hemolytic streptococci: on the contrary not every patient harboring these streptococci within her vagina will suffer this complication.

The ablation or curettage of cancerous vegetations of the uterine cervix has certain advantages: it facilitates treatment; it may suppress the suppuration from the infected cervix; it frees the implantation of the cervical tumor from the orifice of the uterine canal; it permits closer approximation of the radium foci to the outlying cancer tissue; it favors cicatrization and lessens the danger of toxemia from absorption. A bleeding, infected, sphacelic, "cauliflower" cervical tumor should be amputated, preferably by diathermo-coagulation, previous to the introduction of the radium into the vagina and uterine canal.

(b) THE TECHNIC OF APPLICATION

The intra-uterine applicator is a blind rubber tube, 2 mm. thick, 6 cm. long and having a bore of 3 mm. Each radium bearing capsule which it contains is 20 to 22 mm. long; each has a radiating surface of 0.6 by 15 mm. and a wall thickness of 1 mm. of platinum. Each capsule is individually wrapped in 0.2 mm. of aluminum foil to arrest the secondary radiation from the primary platinum filter. In summarizing then, the rubber tube has a radiating surface of 6 to 7 cm., a focal distance of over 3 mm. and a filtration of 1 mm. of platinum for the rays.

The accompanying vaginal applicator is known as the Curie colpostat. Each cork is 1.5 cm. broad and 2.5 cm. long, so that with the radium-containing capsule within its interior,

*Clinic, General Clinic Session, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

†From the School of Medicine, University of Alabama, Tuscaloosa, Ala., and the Seale Harris Clinic, Birmingham, Ala.

more than 0.5 cm. wall of cork is left on either side. Each capsule within the center of the cork has a wall of 1.5 mm. of platinum, primary filter, and a secondary filter of 0.2 mm. of aluminum. Two of these corks are mounted on a 1x10 cm. steel strip covered by rubber tubing. The ends of the cork are sealed with plugs. Then the entire apparatus is immersed in boiling paraffin at 120° C. for twenty minutes, for the purposes of sterilizing and rendering the colpostat impermeable to the vaginal fluids. It should be noted that only the ends of the capsules are directed toward the rectum and bladder.

The depth of the uterine cavity is measured by a sound in order to plan the size of rubber tube to be introduced the following day. It is most essential for the entire length of the uterine cavity to be filled with the radium bearing tubes. A week or ten days having passed since the biopsy and bacterial culture, the patient is admitted to the hospital, where on the first morning the uterus is sounded and the cervical canal dilated without an anesthetic, by the use of graduated French uterine sounds until the maximum is reached. The patient is then returned to bed and her temperature is taken at frequent intervals during the remainder of the day and night. If there has been no increase in temperature, then on the following morning the internal radiation is begun, as illustrated in *Figure 1*. The applicators are introduced into the uterus and vagina without the use of an anesthetic. The treatment continues for five days, in order to obtain the required dosage. Every morning during these five days, all the radium is removed from the uterus and vagina; the patient is given a douche; the rubber tube and contents are boiled; the corks are cleaned with antiseptic solution and the entire apparatus lubricated and reintroduced.

The extreme frequency of parametrial infiltrations and the impossibility of making a diagnostic differentiation between inflammatory and neoplastic indurations necessitate the employment of irradiation to all the pelvic territory invaded or menaced. In lieu of concentrating the radio-active substance in a single foyer or focus occupying a space confined to the center of the neoplastic zone, the total quantity is divided into multiple tubes or capsules (5 to 8 in uterus and vagina). The uterine canal contains three or sometimes four platinum capsules of radium element. In the concavity of the colpostat, intermediate loaded corks are placed if necessary. If the uterine canal is impermeable, the treatment is made at two successive times, the vaginal applicator first (colpostat), the uterine applicator later after regression of the neoplasm has disengaged the canal. If sclerosis of the vagina and atresia of the uterine canal will not permit the employment of this typical disposition, even when two successive treatments are used, then curing by the utero-vaginal application of radium is improbable. In such a case one must be contented with palliation or else augment the internal radium therapy by roentgen therapy or by transpelvic curietherapy.

(c) SOME FUNDAMENTAL FACTORS INFLUENCING THE DOSAGE

(*1*) *Radiosensibility and its Variations.*—True radiosensibility is proportional to the spatial dose of rays absorbed, necessary to sterilize the neoplastic process. It is particularly difficult to appreciate with precision the relative radiosensibility of the cervico-uterine cancers because of the diversity of anatomo-clinical forms, the uncertainty of the extension of the neoplasm and in consequence the inequality of treatment efficiency. It is universally admitted that the exophytic or evertent cancer of the cervix, which forms a more or less voluminous tumor, perhaps filling up and distending the vagina, is very radiosensitive, whereas the infiltrating type of cancer is much less so. But the exophytic type presents itself with extremely favorable anatomo-clinical conditions for radium therapy, whereas the second type (infiltrating) is accompanied by difficulties in treatment technic and, moreover, is usually complicated by profound infection.

(2) *Factors Inherent in the Histological Variety.*—There is absolutely no histogenic analogy, clinical and therapeutic, between the common varieties of non-epidermoid cancers of the skin (the so-called basal-cell cancers) and the non-epidermoid cancers of the cervix uteri. Whereas the basal-cell cancers of the skin are slow growing neoplasms, non-lymphotropic and relatively benign, the non-epidermoid carcinomas of the uterus are rapidly growing, lymphotropic tumors as malignant as the epidermoid variety.

It is generally admitted that adeno-carcinoma of the cervix, without speaking of the greater frequency of its metastases, furnishes a smaller proportion of local cures than the other histological varieties. Perhaps for the adeno-carcinoma it would be better to employ a less elective radiation than for the other species, that is 0.5 mm. of platinum may be sufficient filtration (Regaud).

The two especial types of stratified pavement

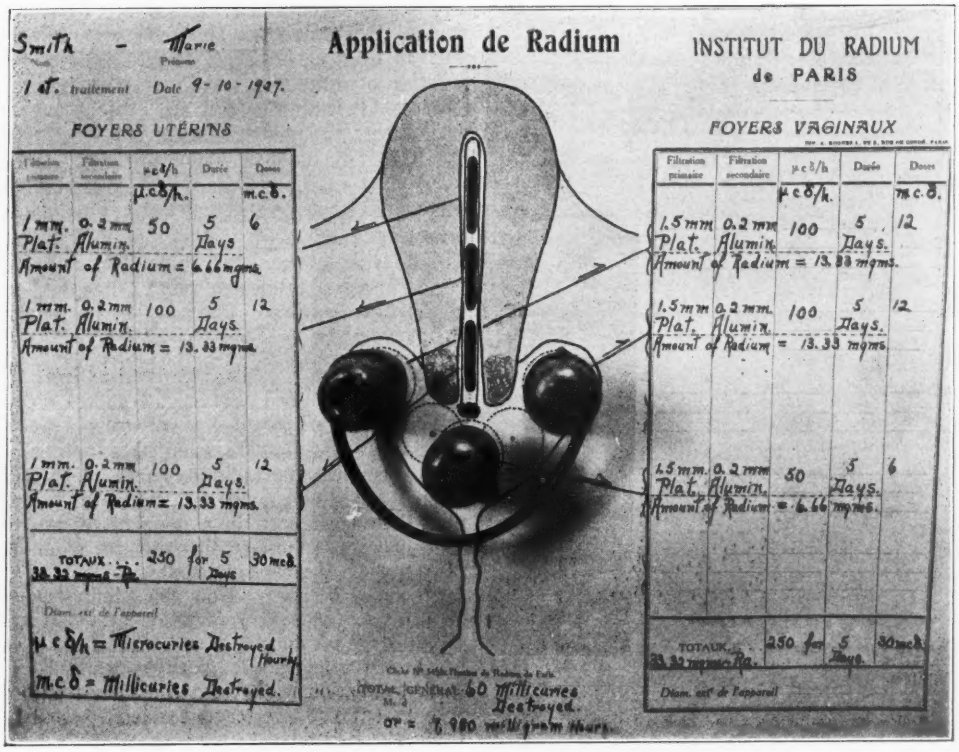
Application de Radium
INSTITUT DU RADIUM
de PARIS
Smith - Marie
1 er. traitement Date 9-10-1927.
FOYERS UTÉRINS
FOYERS VAGINAUX
1 mm. 0.2 mm. 50 5 6
Plat. Alumin. Days
Amount of Radium = 6.66 mgms.
1 mm. 0.2 mm 100 5 12
Plat. Alumin. Days.
Amount of Radium = 13.33 mgms.
1 mm. 0.2 mm 100 5 12
Plat. Alumin. Days.
Amount of Radium = 13.33 mgms.
TOTAUX ... 250 for 5 30 mcs.
μ c δ/h = Microcuries Destroyed Hourly
m.c δ = Millicuries Destroyed.
1.5 mm 0.2 mm 100 5 12
Plat. Alumin. Days.
Amount of Radium = 13.33 mgms.
1.5 mm. 0.2 mm. 100 5 12
Plat. Alumin. Days.
Amount of Radium = 13.33 mgms.
1.5 mm. 0.2 mm 50 5 6
Plat. Alumin. Days.
Amount of Radium = 6.66 mgms.
TOTAUX ... 250 for 5 30 mcs.
Diam. ext de l'appareil
60 Millicuries Destroyed.

Fig. 1.—The utero-vaginal application and dosage of radium.

epitheliomas of the cervix have a radiosensibility of the same degree of grandeur, with a little difference in favor of the epidermoid epithelioma. The stratified pavement epitheliomas of the cervix may be classified histologically into three categories: epitheliomas certainly epidermoid (with indisputable evidence of cellular differentiation towards keratinization), epitheliomas certainly non-epidermoid (without a trace of this evolution) and intermediate epitheliomas (where epidermoid evolution is incomplete). Of the group of epidermoid carcinomas, two varieties exhibit the most favorable response to radium therapy: (a) the epithelioma of typical architecture, with plaited and reduplicated epithelial strips or laminations, limiting cavities where the cells have become detached to appear in the form of concentric squamous globes; (b) the epithelioma of lobulated, corded architecture, where the cells of the basal type are predominant, and with keratinization of the mucous membrane type. Two other varieties are less favorable to radium therapy; (c) the epithelioma of corded architecture, with incomplete stratification, predominant polyhedral cells, abundant net work of intercellular filaments, and an evolution of the cutaneous type as indicated by the character of the squamous cells; (d) the epithelioma of disordered architecture.

(3) *Factors Inherent in the Composition of Connective Tissue.*—Regaud and his collaborators do not attach much importance in radiosensibility to the peopling of the connective tissue of the tumor by mobile cells or leucocytes. In fact, they find the leucocytes concomitant with secondary local infection of the cancer, which has a very unfavorable influence on the prognosis.

(4) *The Influence of Infection.*—The role of infections in the inefficiencies, the dangers and the complications of radium therapy is particularly apropos in cancers of the cervix of the uterus. Local infection constantly accompanies cervico-uterine cancer, at the moment it opens

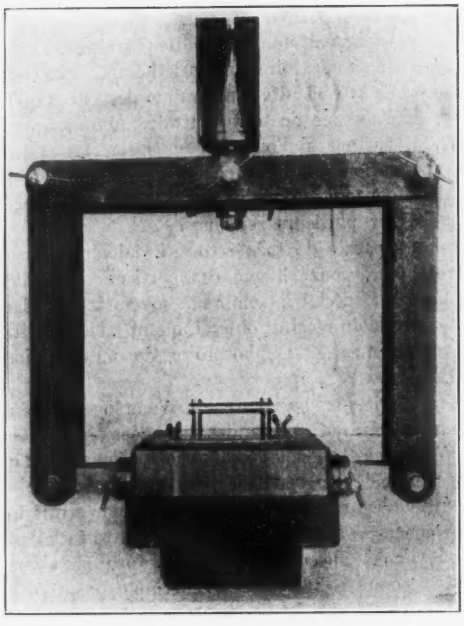

Fig. 2.—An adjustable metallic box containing four grams of radium, for external radium therapy at a distance.

into the vagina. At first superficial, it later extends deeply, equalling the progress of the cancer: finally one can palpate infiltrations of the parametrial conjunctive tissue. Radium therapy may transform a local torpid infection into an acute pelvic cellulitis, or a suppurative salpingitis, or a circumscribed phlegmon of the pelvic conjunctive tissue, or a generalized peritonitis or septicemia.

(5) *The Factor of Acquired Radio-Resistance.*—Immunization of the neoplasm results from the administration of repeated and spaced irradiations. Hence there is a progressive diminution in radio-sensibility under the influence of repeated radium treatments. In the very advanced cancers where a cure is not possible, and where the administration of a large dose of radiation is dangerous, then one must employ a fractionation and espacement of doses, which results in only a temporary palliation. Radio-resistance is not an instantaneously acquired property, but a latent property of cancer tissue. It is not easily produced by the administration of a feeble dose; after the administration of a strong dose, it is not manifested immediatelv after irradiation. The quality of rays which produce the radio-vaccination of the neoplasm is given by a single intensive treatment or by a series of irradiations with fractionation of the dose. It is after a delay of six weeks to two months that the phenomenon becomes apparent and it attains its maximum even later. Once acquired, this radio-resistance persists indefinitely. At the same time that the neoplastic tissue is becoming refractory to radium the general tissues (connective tissue, blood vessels) are rendered incapable of supporting a new radium treatment without great danger of radium necrosis. This prevents the curing of cancer.

(6) *Artificial Radio-Sensibilization.*—It is definitely established that in the course of its existence, a cell or a line of cells (cancer especially) pass through alternating phases of radio-sensibility and radio-resistance. The cells are particularly radio-resistant when for a long time they have been in a state of repose or rest. They are most sensitive to the action of radium when they are in the state of mitosis or indirect cell division. Now the administration of a feeble (exciting?) radiation of the tumor several days previous to a cancericidal radiation has been recommended: perhaps this initial weak irradiation provokes a generalized mitotic activity (provocative reaction), as suggested by Professor Regaud.

(7) *The Factor of Time.*—The dose, all other conditions remaining unchanged, is equal to the product of two factors, namely, the intensity of the rays and the time of irradiation. Now without modifying the product, one may vary either the intensity or the time on the condition that a compensation of the variation of the one by an inverse variation of the other be made. In the case of the pavement epidermoid carcinoma, which is the most common variety of cancer of the cervix, Professor Regaud has estimated that the optimal duration of radium application is for 6 to 10 days (internal radiation). On account of the double alternating phenomenon of cell reproductive activity, a short irradiation will destroy only those cells which at the moment are in a state of their maximal radio-sensibility: it spares the others. On the contrary, a long irradiation or a treatment by doses repeated during a certain time, destroys all the mother cells successively, because as the cycle of cellular renovation continues, each cell passes at some time into the phase of maximal sensibility. If the time of irradiation is short, very severe reactions may occur.

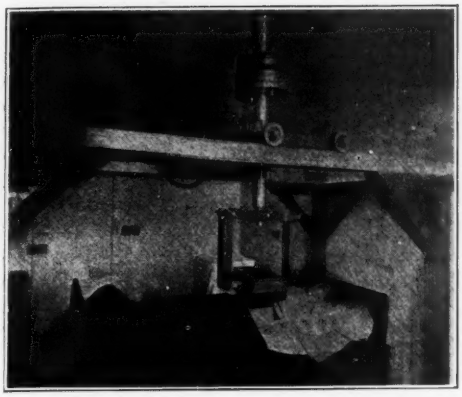

Fig. 3.—An ensemble view of the apparatus in situ, over one of the anterior areas, during the treatment of a patient having a cancer of the uterine cervix.

(8) *The Quantities of Rays Absorbed: the Dose (Radium Therapy).*—It is best to administer to all the neoplastic territory, the maximal quantity of rays compatible with the maintenance of tissue integrity. There are certain physical measures of the dosage. One should know the quantity of the rays: at the source, there is given the "dose of emission of radium," at the surface or the point of entrance of the radium rays into the body is the "superficial dose;" into the neoplastic territory and by unit volume of the tissues treated is the "spatial absorbed dose." One knows with rigorous precision the dose of emission because this is invariable. The dose emitted is expressed by two different notations. The one has for its basis the intensity of the rays and the duration of their application; the intensity of the rays is proportional to the quantity of radio-active substance present; the dose is obtained by the product of the quantity and the time, which is expressed as milligram hours of radium or as millicurie hours of radon, (radium emanation). The other notation, which is utilized throughout France, makes the dose proportional to the quantity of radium destroyed during the course of its application.—(Debierne and Regaud 1914; Regaud and Ferroux 1919). This is expressed in terms of "millicuries destroyed" or of "microcuries destroyed," the latter term being only one-thousandth of the former.

To explain this terminology in greater detail, one can refer to the known fact that the therapeutic efficiency of one millicurie of radium emanation (radon) is equivalent to only 133 millicurie hours. Therefore one "millicurie destroyed" is the therapeutic equivalent of 133 millicurie hours, or of 133 milligram hours. So that one milligram of radium acting for 133 hours is referred to as one "millicurie destroyed."

At the Radium Institute, 50 millicuries destroyed is the usual dose, but 60 millicuries destroyed (8,000 milligram hours) can be given without inconvenience, by using six foci, three intra-uterine and three intra-vaginal. On the other hand the incomplete permeability of the uterine canal and the smallness or insufficient suppleness of the vagina may not permit the placement of more than three or four radium tubes, in which case the internal dose of radium would be diminished to thirty or forty millicuries destroyed. In the event of an extensive cancerous infiltration it is not possible to cure the patient by intra-utero-vaginal radium therapy alone. It is useless and dangerous to give a dose of 70 millicuries destroyed, because this may expose the patient to vaginal, rectal and vesical lesions, with no additional therapeutic compensation.

The reason for employing 6.66 mg. and 13.33 mg. of radium element in the vaginal and uterine tubes, is that these have respective therapeutic strengths of 50 and 100 microcuries destroyed hourly. Hence in computing, the single 13.33 mg. tube acting for 24 hours, would give 24 times 100 microcuries destroyed which would be 2400 microcuries destroyed or 2.4 millicuries destroyed. The distribution of the 6.66 and 13.33 mg. tubes may be varied depending on the size of the local lesion and its extension into the uterus and parametrium.

(d) CONTRA-INDICATIONS TO INTRA-UTERO-VAGINAL RADIATION

In very advanced cases, radium therapy by the utero-vaginal route is a dangerous and inefficient method; dangerous because it favors infectious accidents and possibly perforations; inefficient because it does not sterilize the peripheral part of the cancerous territory. The absolute contra-indications are: (a) a state of radio-resistance following a series of previous treatments; (b) the existence of a local or general infectious state that is not possible to be suppressed; (c) cachexia, caused by anemia following repeated hemorrhages, uremia by compression of the ureters; (d) concomitant, grave, chronic or acute affections such as diabetes, Bright's disease, cirrhosis of the liver, cardiopathy, pulmonary tuberculosis; (e) generaliza-

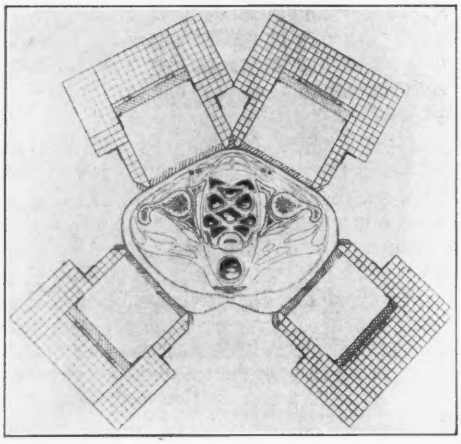

Fig. 4.—A schematic cross-section illustrating four of the positions occupied by the apparatus in the treatment of cancer of the uterine cervix.

tion of the cancer to the peritoneum or other viscera.

(II) EXTERNAL RADIUM THERAPY AT A DISTANCE

Comparative experience in the treatment of epidermoid cancers of the skin and mucous membranes demonstrates the superiority of the gamma ray of radium over the x-ray. External or surface radium therapy is, however, more expensive than roentgen therapy, because of the initial cost of the large amount of radium. The advantages of external radium therapy over roentgen therapy are: (1) greater specificity or electivity of action, (2) the constancy of the emission rate of radium, (3) the simplicity of the manipulations in the treatment, (4) the absence or lack of continual repairs to the apparatus, (5) the ease of realizing an organization, limiting all loss of time in the employment of the radium tube.

The apparatus for external radium therapy at a distance consists of a very heavy box or "pack," with thick lead walls and top. It is mounted on a frame and is adjustable at any angle. The amount of radium within the box is 4 grams of the element. The radiating surface of the bottom of the box has an area of 125 square cm. The distance of the radium from the skin (focal distance) is constantly maintained at 10 cm. The filter consists of 1 mm. of brass and 0.5 mm. of gold, which is the filtration equivalent of 1 mm. of platinum.

This method of external radium therapy, or external curietherapy, as it is termed by the French, is used especially for carcinomas of the uterus, vagina and rectum. It is quite useful for very advanced cancers where curietherapy by the utero-vaginal route is impractical, futile and dangerous; in inoperable cancers or those at the limit of operability where this last method is practical but insufficient; and for recurrences after hysterectomy.

In order to cross-fire into the pelvis, this radium block is applied over six to eight areas, depending on the nature of the case and the size of the woman. The areas selected are often as follows: (1) suprapubic, (2) right antero-lateral abdominal, (3) left antero-lateral abdominal, (4) left lateral, (5) right lateral, (6) left sacro-gluteal, (7) right sacro-gluteal, and (8) perineal or pubo-vulvar. The areas are delineated first with an indelible pencil and numbered. None of the skin areas overlap. Every skin area is 125 cm. square in size, except the pubo-vulvar site, which is approximately 80 square cm.

The total dosage administered by this manner may be as high as 2 to 2.5 curies destroyed, which is the same as 2000 to 2500 millicuries destroyed, or 266,000 to 332,500 milligram hours. Of course this is an enormous dose, but it is distributed over six to eight skin areas, so each area would receive between 41,500 and 44,300 milligram hours, which is about the maximum the radiologist would wish to give, even of gamma rays. Four grams of radium give 4000 milligram hours for every hour it is in use; by the Curie standard, this is thirty millicuries destroyed hourly. The patient is radiated for either two or three hours daily, consequently she receives during each day either two or three times thirty millicuries destroyed which is 60 to 90 millicuries destroyed, or 8000 to 12,000 milligram hours. At this rate it takes almost thirty days to complete the external radiation, the patient being radiated daily. Dr. Regaud would prefer giving the total amount within three weeks if the institute possessed more radium. Only one area is treated daily; the next day the second area is treated, the next day the third area, and so on. After the eighth area has been treated, the cycle is begun again with area number one. External curietherapy is not carried on while radium is within the uterus and vagina, because of the danger of secondary radiations, but only immediately after this is removed.

In the treatments of cervico-uterine cancer by external foci at a distance, for a dose emitted of

300 millicuries destroyed over one portal of entry, the superficial dose of the cutaneous portal of entry is in the neighborhood of 300 m.c.d.÷125 sq. cm.=2.4 millicuries destroyed per square centimeter of skin. The spatial dose absorbed is the correct dosimetric expression, but to determine it is impossible in cancer of the cervix.

The biological considerations in the dosage of external curietherapy are interesting and important. Erythema of the skin is a poor biological criterion and should be abandoned. Its effect is inconstant, unequal and fleeting; it cannot be measured with precision, because it is a functional state and not a lesion. The substitution for the cutaneous erythema of another biological criterion, for example, the elective destruction of the epidermis (the elective radio-epidermitis of Regaud and Nogier, 1913) furnishes a more precise basis of comparison (epidermicidal dose). However, the utilization of many portals of entry permits the radiologist to give to the cancerous uterine territory a cancericidal dose without producing a radio-epidermitis, producing only a mild erythema which is followed by a furfuraceous desquamation. The cancericidal dose is generally inferior (1/10 to 1/4) to the destructive epidermicidal dose.

(III) INTERSTITIAL RADIUM THERAPY AND RADIUM SURGERY

The interstitial use of radium in this region is dangerous. The simultaneous employment of radium puncture and intra-utero-vaginal irradiation may cause secondary rays excited by the impingement of gamma rays on the platinum needles or seeds. Such beta-therapy increases the danger of radium necrosis.

(IV) THE ROLE OF ROENTGEN THERAPY

Multiplication of the portals of entry permits the concentration of a considerable dose within the depths, without lesions of the skin. The method of large areas with strong filtration has been adopted at the Radium Institute since 1922. The radiant energy is administered in the following manner: a kilovoltage of 185 to 200, milliamperage 4 to 6, focal distance of 50 centimeters, filter of 2.5 mm. of zinc, 3 mm. of aluminum and 3 cm. of wood. There are six or more over-lapping fields, abdominal, gluteal, lateral and perineal: the fields vary in size from 150 to 400 square cm. The entire duration of radiation is 25 to 55 hours, which is given over fifteen to twenty-five days, by administering a forty-five minute treatment twice daily. The indications for roentgen therapy alone are the same as mentioned under external curietherapy.

(V) THE ROLE OF SURGERY ALONE

In an operable case or one near the limit of operability and without previous irradiation and without adnexal infection, the question is complicated by the eventuality of pre-operative radium therapy. The absolute indications for surgery are in those instances where radium therapy is inefficient or dangerous: (a) inefficient where the cancer is known to be radio-resistant, as (1) when an operable cancer has been treated by radium therapy and has proven radio-resistant, so that more radiation might cause radium necrosis, consequently hysterectomy remains the last choice, (2) and those cancers which are very feebly radiosensitive such as the adenocarcinoma; (b) inefficient by the utero-vaginal method of applying radium when a malformation of the uterus (atresia, irreducible flexion) or of the vagina (congenital or cicatricial stenosis) will not permit the typical and correct technic. If the case is operable, then it is best to practice hysterectomy and reserve radiation therapy (x-ray and external foci of radium) as a resource against recurrence. (c) Radiation therapy is dangerous when the cancer is complicated by adnexal inflammation. One may attempt to suppress the inflammatory or suppurative process, and if sufficiently successful, may later attempt surgical removal followed by external radiation.

(VI) ASSOCIATION OF RADIUM THERAPY AND HYSTERECTOMY

Some surgeons have complained of operative difficulties following radium therapy. Regaud believes that the operative difficulties following utero-vaginal radium therapy, and not explainable by errors in technic, are due mainly to the cicatricial healing of the inflammatory lesions, which so commonly accompany the cancerous infiltration, rather than to the sclerosis of the cancer tissue itself. What are the qualifications of operability? They include perfect mobility of the uterus, suppleness of the parametria and absence of all symptoms of extension of the cancer. Now radium therapy in such a case has no primary operative mortality. Surgical treatment has a mortality which varies, not only according to the skill of the operators, but also to the severity of the operable cases. The operative mortality is usually between 10 and 20 per cent. Regaud admits the utility of the surgical act for the better selected cases, but believes that

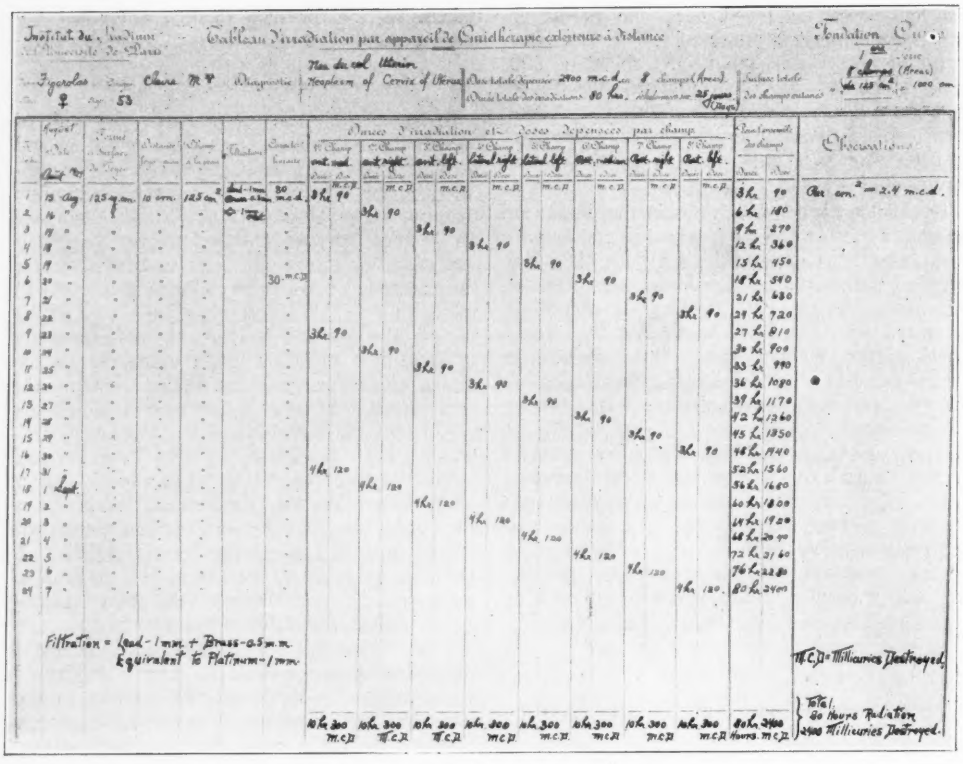
Institut du Radium
Université de Paris
Tableau d'irradiation par appareil de Curiethérapie exclusivement à distance
Fondation Curie
Figarolas
Clinique M. P.
Diagnostic
Nom du mal. Utérus
Neoplasm of Cervix of Uterus
Durées totales d'exposition
Durée totale des irradiations
Nombre de champs (Ports)
Surface totale des champs cutanés
Durées d'irradiation et doses dépendues par champs
Résultat immédiat
Observations
1er Champ ant. med.
2e Champ ant. right
3e Champ ant. left
4e Champ lateral right
5e Champ lateral left
6e Champ Ovar. right
7e Champ Ovar. left
8e Champ Ovar. left
Fitration = Lead - 1 mm. + Brass - 0.5 m.m. Equivalent to Platinum - 1 mm.
Total
Total 80 Hours Radiation
2400 Millicuries Destroyed.

Fig. 5.—A tablet of radiation by the apparatus for external radium therapy at a distance.

it is preferable to have the surgery follow preoperative radium therapy, for the following reasons: (1) if the cancer is operable and the patient is in good condition, hysterectomy is not rendered difficult by a previous radium therapy; (2) a previous internal utero-vaginal radiation asepticizes the vagina and heals the malignant ulcer, if present; (3) the employment of the two methods successively permits the rapid restoration of the patient to a better state and incontestably augments her chances for a cure, without adding much additional risk.

What interval of time should lapse between the radium treatment and the operation? Regaud believes that it is best to give sufficient time necessary for the phenomenon of tissue reparation, which is about two months for the optimum. At the Radium Institute they are becoming less and less favorably inclined to the systematic association of radiation and operation, because the results from irradiation alone in such cases are so good during the last eight years, that the operative risk will more than equal the little percentage of supplementary chances of curing which hysterectomy gives. In adeno-carcinoma of the cervix, utero-vaginal radium therapy may precede the hysterectomy if the cancer is operable.

(VII) ASSOCIATION OF RADIUM THERAPY AND ROENTGEN THERAPY

The association of radium therapy and roentgen therapy is for the purpose of securing the combined action of the x-rays (in the peripheral part of the neoplastic territory) and of radium in the uterus and vagina. When the neoplasm has extended beyond the uterus (parametrium, vagina, pelvic adenopathies) this combination is the method of choice and is the rule in the majority of instances. Regaud believes that the order of succession of these two agents is not an indifferent matter. The inefficiency of the x-rays in the treatment of recurrences following previous radium therapy has been shown by

Regaud (1923) apropos of epitheliomas of the skin and mucous membranes in general. X-rays are especially inefficient after radium therapy has been given by the utero-vaginal method. To use these agents in the correct combination, roentgen therapy should be administered first, followed immediately, or after a very short period of rest, by radium therapy.

(VIII) ASSOCIATION OF HYSTERECTOMY-RADIUM THERAPY AND OF HYSTERECTOMY-ROENTGEN THERAPY

The association of hysterectomy followed by radium therapy (vaginal route) is a very poor procedure and should be condemned, because the hysterectomy not only runs the risk of diffusing the cancer into the pelvic connective tissue, but removes forever the uterine canal, which is the very best place for radioactive foci. It is not recommendable to adopt as a general principle the systematic practice of post-operative roentgen therapy for the prevention of recurrences after hysterectomy. But when a hysterectomized patient (for epidermoid cancer of the cervix) presents herself with a recurrence, irradiation by external foci (x-rays, radium) is the very best treatment.

(IX) PROGNOSTIC CLASSIFICATION OF CANCERS OF THE CERVIX UTERI

Group One or First Degree, cancers are strictly limited to the cervix. They are good operable cases. Treatment can be by either hysterectomy, internal curietherapy, or internal curietherapy followed by hysterectomy.

Group Two or Second Degree, cancers are beginning to indurate one or two of the lateral cul-de-sacs, with or without infiltration of the juxta-uterine part of the parametrium of one or the two sides, but without immobilization of the uterus. Such cases are at the limit of operability. Treatment is by internal curietherapy alone, sometimes supplemented by external radiation.

Group Three or Third Degree, cancers are accompanied by extensive induration of the parametrium of one or the two sides, ulceration or pronounced induration of the vaginal dome and fixation of the uterus. These cases are inoperable. Treatment is by internal curietherapy if possible, which may be either preceded by x-radiation or followed by external radium therapy at a distance.

Group Four or Fourth Degree, cancers extensively invade the neighboring viscera, neoplastic pelvic block, and so forth. The prognosis is hopeless. These cancers are dangerous to treat because of the ever present infection. One may use external radiation, palliatively.

(X) RESULTS AT THE RADIUM INSTITUTE

(a) *Radium "Accidents".*—These are the consequence of faulty dosage and technic by inexperienced physicians. The causes are: insufficient primary and secondary filtration, too short a distance of application, an incorrect position of the vaginal foci, notably in the posterior cul-de-sac where placement must be very prudent, a dose too strong at one point or the poorly timed repetition of treatments.

(b) *Cures.*—No statistics will be cited here, but the results are more favorable than those reported from other sources, according to a recent survey from the Radium Institute. Regaud calls a case cured if no symptoms nor signs upon examination appear within five years after treatment. In certain apparently advanced cases the peri-uterine tumors disappear without leaving any traces. At other times there remains a minimal diffuse induration: frequently a fibrous band extends to the pelvic wall, with or without fixation of the uterus and lateral retraction. The explanation of these differences is not known with certitude. Regaud is inclined to think that the *restitutio ad integrum* is the natural history of the cancers without secondary infection, and that the fibrous bands are sequelae of old inflammatory lesions.

(XI) SUMMARY OF THERAPEUTIC INDICATIONS

(1) Cancers deemed best for surgery but not absolutely confined to surgery are:

(a) The adeno-carcinoma of the cervix.

(b) Cancers coincident with an adnexal infection.

(c) Cancers persisting after the failure of a preceding radium therapy.

(d) Cancers coincident with vaginal malformations of certain types.

(2) All other operable cases in good condition are treated by utero-vaginal radium therapy. This is preferable to hysterectomy, which may be successful admittedly, but only a few of the total number of patients coming to consultation could be operated upon safely.

(3) The post-curietherapeutic hysterectomy (that is, after internal radium therapy) is recommendable and gives good results only in those

cases which were apparently operable before the radium treatment.

(4) The pre-curietherapeutic hysterectomy, that is, hysterectomy followed by radium therapy, should not be done except in those rare instances where malformations or occlusions of the vagina and uterus exist.

(5) Roentgen therapy alone or external radium therapy at a distance is, for the moment, the method of choice in inoperable cases, where the condition of the uterus and vagina does not permit the correct radium usage. This is the necessary method where recurrence follows hysterectomy.

(6) The association of x-rays or radium at a distance with radium applied utero-vaginally is the correct method when the parametrium is invaded.

(XII) NOTE ON CANCER OF THE BODY OF THE UTERUS

Once carcinoma of the body of the uterus is diagnosed, the question of operability is considered. If operable, then hysterectomy is immediately performed. If inoperable, then radium therapy is the method of choice. The general principle of radiation treatment differs from that in use for cancer of the cervix. Cancer of the body of the uterus is treated at three different periods, each lasting three days, and each period being one month apart, for example, three days in January, three days in February and three days in March.

The amount and manner of radiation are variable. Emphasis is placed on the intra-uterine tandem of capsules rather than on the Curie colpostat. Always 13.33 milligrams of radium element are placed in the fundus, the same amount in the middle of the uterine cavity and usually 6.66 milligrams in the cervix. During the first and second periods of treatment the Curie colpostat is used in the vagina, but this may be dispensed with in the third and final treatment if no cervical nor broad ligament extension is present. The amount of radiation from the vagina depends considerably on the individual case.

After this internal radium therapy, there follows external radiation, preferably with the large radium box or "pack". If the x-ray is used, it always precedes the radium treatment. One disadvantage after x-ray is that the uterine canal may be so small as to prevent, in some cases, the intra-uterine introduction of radium.

AUTHOR'S NOTE: I wish to express my gratitude to Professor Claude Regaud, Director of the Radium Institute of the University of Paris, and his able colleagues, Dr. Lacassagne, Vice-Director, Dr. Monod, radium therapist and Dr. Coutard, roentgenologist, for the information contained herein and for the kindness shown to me during my studies in their Institute.

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RESULTS IN THE X-RAY TREATMENT OF SKIN CANCER*

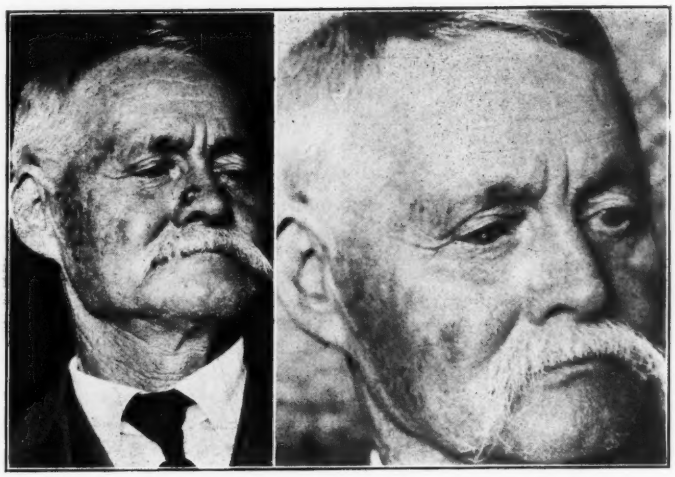
By W. S. LAWRENCE, M.D.,
Memphis, Tenn.

I wish to present first for your consideration two patients, whose cases do not come under the head of skin cancer, but who have apparently been cured of a condition believed to be incurable, one four, and the other seven years ago. I will ask them to walk among you later.

Case 1.—This gentleman was suffering from a condition, the diagnosis of which was not completely agreed upon. Microscopists differed in their opinions, but it was a serious, relapsing condition. He was operated upon three times to my knowledge, and had several previous operations, but the lesions continued to recur in the form of tumor masses under the skin, down the neck and the shoulder, and clinically were carcinoma. Under x-ray therapy he made a complete recovery. One year after the first series of treatments there was a mild relapse in the form of small glands in the neck. Upon further x-ray treatment they entirely disappeared. The only remaining trace of the disease is, as you see, the several extensive but soft and pliable surgical scars.

Case 2.—This man was restored to health not by means of the x-ray but by another form of radiation, namely, ultra-violet. In this case the history, diagnosis

*Clinic, Clinic Session, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.



As first seen. Case 3 Result of treatment.

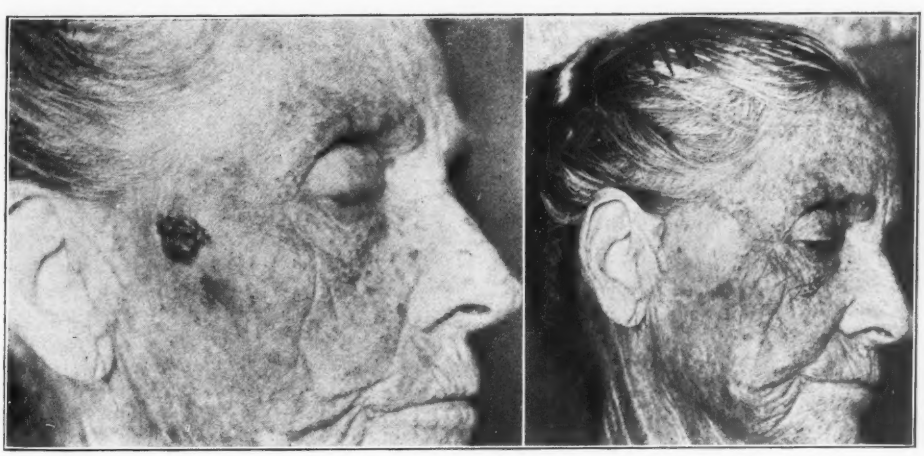
and course of the disease are well known. This man had systemic blastomycosis, with numerous skin lesions over the body and two large abscesses on the back, one of which had been drained but would not heal. The causative micro-organisms were obtained from the skin lesions, from the sputum, and from the pus draining from the opened abscess. The x-ray film of his lungs resembled a caseated tuberculosis, and could hardly be differentiated from it. The blood count showed 3,400,000 red cells, and 70 per cent hemoglobin. He had been saturated with iodid of potash, the accepted treatment, but made no favorable response. He was losing flesh and confined to bed most of the time.

The skin lesions responded very promptly to x-ray treatment and were soon entirely healed. X-ray treatment of the lungs, however, did not improve his general condition and was discontinued. In the hope of raising the patient's resistance and improving his blood picture, ultra-violet radiation of the whole body was begun and all other measures were discontinued. Somewhat to our astonishment he began to improve in a general way, gaining weight, strength and color. Treatments were given every other day. The blood picture became practically normal in about three weeks. The abscess which had been opened entirely healed, and the one which had not been opened completely subsided. The cough was no longer distressing. Treatment, however, was continued for about two months. At the end of that time he was normal in weight, strength, color and lung expansion. Since then he has lost scarcely a day from his work. As you see him now he has nothing to show for his serious illness except the crucial scar on his back.

I have heard recently of a case of proven systemic blastomycosis which recovered after some months of sea and sun bathing on the coast of Florida. In all probability the ultra-violet from the sun light was the chief factor in promoting a return to health.

The remainder of my time I will devote to some lantern slides of skin cancer before and after x-ray treatment.

I have been prompted to some extent to pre-



On admission Case 4 Result of treatment.

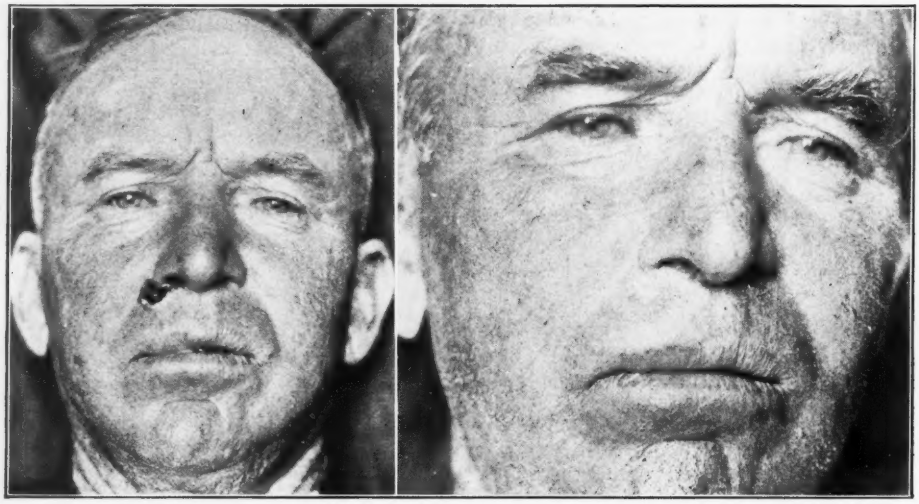
On admission. Case 5 Result of treatment.

sent this subject by the fact that about a year ago a very eminent dermatologist, talking on skin cancer, positively advised against the use of the x-ray as a method of treatment. As a means of strengthening his position in this matter, he showed various slides illustrating the horrible results that can be gotten by the use, or rather misuse, of this agent. The argument does not appear to me to be much stronger than to call attention to the fact that some surgeons' knives do not cut right, and since surgical mutilations and deaths do at times occur it would be best to do away with surgery altogether.

But the strangest part of the speaker's views was this: immediately after condemning the use of the x-ray in the treatment of skin cancer, he advised the use of radium for this purpose.

Now of course all those who are sufficiently interested to inform themselves, know that just as many bad results from the misuse of radium could be shown as from the misuse of the x-ray. But apart from this more or less unimportant observation, to state categorically that we should use radium and not x-ray or use x-ray and not radium, is somewhat in the nature of an absurdity "For these twain are one" or practically one. They are both a form, or source of *radiation.* In using either we are using radiation, and radiation of the same order of wave length. So far as is known to the physicist, the radiologist, and the pathologist, the response of living tissue to the rays from radium and to the rays from an x-ray tube is the same. It would seem, then, that to advise us always to use radium and never x-ray is on a par with the advice "always use Rochelle and never Epsom salt."

A recognition of the very great difference in distribution within the tissue of the rays from these two sources should determine which source it is wisest to use in any given case,



On admission. Case 6 After three x-ray treatments.

Before treatment. Case 7 Six months after final treatment.

but on surface lesions this distribution can be so regulated that either source of radiation may be used with identical results.

Illustrative of the results that may at least sometimes be obtained by the use of the x-ray in the treatment of skin cancer, I beg to show slides of the following cases.

Case 3.—J. W. M. This lesion resulted from the malignant degeneration of a large mole during a number of years. This patient received three unfiltered erythema doses about two weeks apart. A month after the last of these three when healing was apparently complete, he received one sub-erythema dose of filtered radiation. The second slide shows the result.

Case 4.—Mrs. N. S. This is the fungoid type of basal cell epithelioma. This case was fulgurated and then received about the same treatment as case 1. The results are seen in the second slide.

Case 5.—J. J. B. This old gentleman had as you see a very large fungoid (basal cell) epithelioma. It measured 2.5 inches in diameter and 1 inch in height. It was of one year's duration and had grown very rapidly in the preceding four months. This growth was given at the first sitting three filtered erythema doses directed toward its center through three fields, the center of each field being 120 degrees from the center of the adjacent field. Improvement was rapid. One month later what remained of the original growth was electro-coagulated and this was followed immediately by an erythema dose of filtered radiation. Three weeks later healing was nearly complete. Seventy-five days from the initial treatment the final dose was given. He was seen a year later with no sign of his former disease. The scar was healthy and flexible. He appeared about as you see him in the second slide.

Case 6.—S. H. B. This is the rodent ulcer type. The crater of this ulcer was about 5 mm. deep and its raised and inflamed edge was about 2 mm. high. The crater was filled with pus and partially covered by thick crusts. Improvement was rapid after the first x-ray treatment which consisted of one and a half erythema doses, one-half filtered and one-half unfiltered. Two other less intense doses were given. A month after the last of these, healing was complete as you see from the second slide.

Case 7.—Mrs. R. M. F. In this case the disease was of long standing, about ten years, and quite extensive. All of the skin from the hair line on the forehead to the outer canthus of the right eye, and most of the right temple was involved. The conjunctival fold at the outer canthus was also involved, in the form of a small tumor about 3 mm. in thickness and 6 mm. in diameter which protruded somewhat between the lids. This patient had in all nine treatments during a period of three months. A part of this treatment directed to the involved skin was unfiltered, and a part of it directed to the conjunctival tumor was rather highly filtered. All of the skin involved in this case is now completely healed. The scar is soft and flexible. The conjunctival tumor has apparently entirely disappeared. *Slide 2* shows the patient as she appeared five months after treatment was discontinued.

MATERNAL TREATMENT AFTER DELIVERY: WITH LANTERN SLIDES*

By CALVIN R. HANNAH, M.D., F.A.C.S.†
Dallas, Texas.

Competent prenatal care and scientific conduct of labor will prevent many of the complications to which the mother is subject following delivery. Detailed methods for the treatment of complications during pregnancy which would act as a prophylactic and have a direct effect on the after-treatment of labor are so generally known that it is unnecessary to dwell at length on them. However, a failure to observe, and the neglect to correct any complication in its incipiency during pregnancy is hazardous, may complicate labor, and later retard the recovery of the mother.

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*Read in Section on Obstetrics, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

†Professor of Obstetrics, Baylor University, College of Medicine, Dallas, Texas.

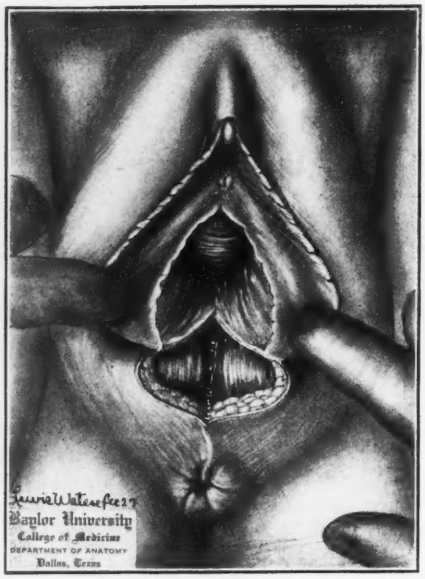

Fig. 1
Tissues separated by perineotomy.

When well executed, the conduct of labor *per se* lowers morbidity and predisposes to the prompt recovery of the mother. Years of observation in deliveries and a knowledge of the anatomy of the pelvic fascia, perineum and the relativity between the bladder, uterus and rectum have taught the profession that during labor pelvic tissues may tear, sometimes causing cystocele, rectocele or procidentia. Cystocele is the result of torn fascia between the cervix and bladder; rectocele is caused by the fascia being torn between the cervix and rectum; and procidentia is the result when the injury to the fascia is in the base of the broad and uterosacral ligaments. These injuries are often preventable and may occur with less frequency in the future because of greater efficiency in obstetrics and recognition of this specialty; and this increased scientific knowledge is a potential factor in the prevention of unnecessary injuries and complications during the puerperium. Bearing down in the first stage of labor with or without a full bladder is dangerous because it may tear the fascia between the cervix and rectum. A full rectum, though not so dangerous, may tear the fascia between the rectum and cervix, both of which predispose to cystocele and rectocele. Fascial injuries are more frequent among the primiparae because the cervix is slower in effacing, dilating and retracting. Symptoms of injury from labor may not appear for a long time after delivery when leucorrhea, backache or pelvic fullness appear. They are due to conditions of long duration which should have been diagnosed early and treated.

Central perineotomy done at the proper time is indispensable in maintaining the function of the perineal diaphragm, and is an important factor in saving the perineum, preventing tears of the pubocervical fascia, and the pushing down and over-stretching of the anterior wall of the vagina. I prefer the median incision to the lateral. It conforms more to the anatomical structures by saving the muscles and nerves from greater injury. If the pelvic outlet is contracted or the angle of the pubic arch is acute, then a lateral incision may protect the sphincter ani better than a central perineotomy. The extent of the incision depends wholly upon the size of the fetus and conditions of the soft parts, but usually it will extend down to the anal sphincter. The perineotomy permits the head to deliver early and prevent vaginal tears which are irregular, unlimited and difficult to repair.

A well conducted third stage of labor is a prophylactic treatment for the puerperium and

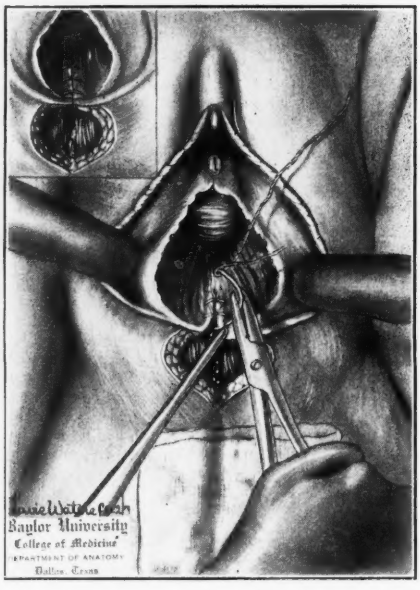

Fig. 2
First steps in repair of perineum, showing two sutures in place and third suture approximating the mucus membrane of the wall of vagina. Insert (upper left hand corner); vaginal suture in place.

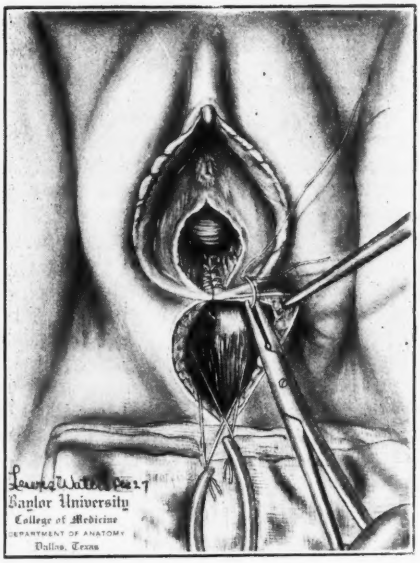

Fig. 3
Two sutures (passed around rather than through the levator ani). The third suture is being passed around.

is of inestimable value in preventing infection. Haste at this time with rough manipulation of the uterus is poor technic for if the uterus is left undisturbed, it will contract and retract, separate and expel the placenta and chorion without an unusual loss of blood, a physiological phenomenon necessary for a rapid recovery. Should indications warrant interference, as, severe bleeding from uterine inertia or adhered placenta, then, with as little traumatism and injury as possible, promptly attempt to correct the cause.

As soon as the placenta is delivered, a repair of the cervix and perineum should be done. Probably it is not wise to attempt a repair of the cervix when aseptic conditions are not present, or when the environment is such as to warrant delay; however, if the bleeding from the cervix is dribbling or sufficiently severe to reduce the resistance of the patient, it then doubtless would be wise to do a repair promptly. Tonic retraction of the uterus closes the blood sinuses and prevents bleeding. Any condition that may interfere with normal contraction and retraction of the uterus may cause post-partum hemorrhage. Hemorrhage in cesarean section will continue as long as the uterus is out of the abdomen or when there is a full bladder which pushes the uterus up and causes the bleeding to stop when the bladder is emptied. This phenomenon of the puerperal uterus is partly due to the effacement of the ovarian and uterine arteries which occurs when the uterus contracts, or when the pulling up of the uterus opens out the concertina and permits the blood to flow through the arteries.

The mucus coat of the vagina is closed either with interrupted or running sutures; then, interrupted twenty-day chromic cat gut sutures are passed around the levator ani muscles and securely, but not tightly tied. Infection and necrosis follow tight ligatures which prevent free circulation of the blood. The superficial muscles and fascia are brought together by a continuous suture starting at the fourchette, extending down to the lower end of the perineotomy, then returning, bringing the most superficial fascia together where it is tied to the end of the same suture. The skin is closed by a subcuticular silk worm suture which seals the wound from blood, lochia and other contaminations which are present in this field of operations. The after care is keeping the field clean. Soap and water are excellent germicides and will keep the field clean if applied by sponging downward. Lysol, bichlorid of mercury and other germicides are used, but if the above technic is exercised in cleaning the field by not smearing the perineum with feces, infection will be a minor factor de-

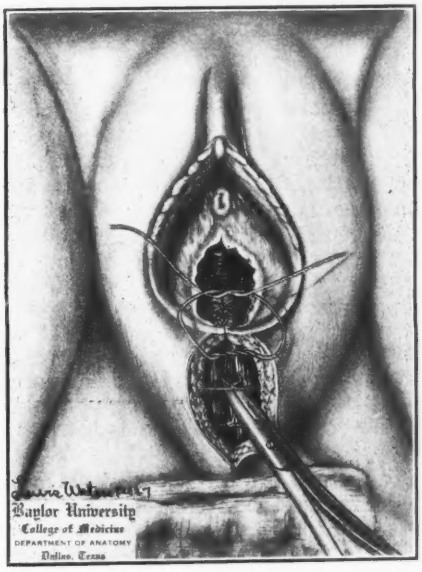

Fig. 4
All sutures in place, after being passed around levator ani; showing laxity of suture after being tied, to prevent necrosis of the tissues.

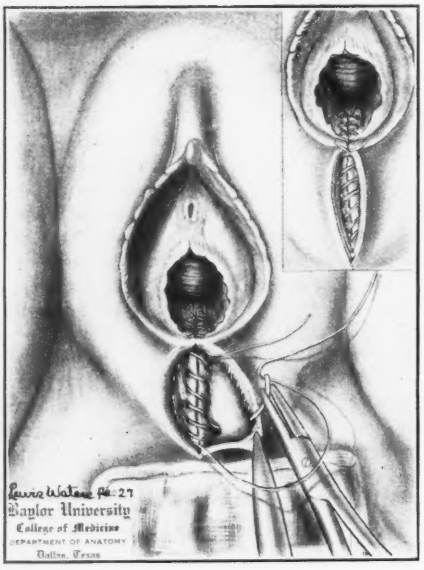

Fig. 5

Continuous suture picking up levator ani fascia, beginning near fourchette; down to lower part of incision; returning and bringing the superficial fascia, and tied as in insert (upper left hand corner).

pendent on the method of repair. It is well to remember that the flow is down and over and not into the wound.

After delivery, the patient should sleep and rest. Morphine and bromids are given whenever necessary to relieve pain and secure sleep, two essentials for the treatment of the puerperium. General diet is prescribed and the patient is encouraged to eat, unless there are contra-indications, when a special diet is outlined. Within a short time after delivery, the patient should change her position frequently by lying on her sides, and in a few days assume the prone position often. These positions favor drainage and secure rest. Clots are the result of blood's being retained in the vagina because of continued dorsal position. If the patient is careful in changing her posture, embolus is not likely to occur.

For the first two or three days the quantity of urine increases and over-distention of the bladder should not be permitted. If the patient is unable to void in a dorsal position, resort to catherization, and, in some cases, a sitting posture, or getting out of bed may be advisable. It is better to catheterize than to have a break in the mucous membrane of the bladder from over-distention which may go unrecognized and later result in an acute attack of cystitis and eventually pyelitis.

Cathartics are usually unnecessary, and surely these should not be drastic in action. Enemata are preferable for these do not cause particular discomfort, will relieve gas, usually prevent excessive peristalsis and will not deplete the milk constituents of the blood as hydrogogues may.

Mammary glands should be supported by bandages and the nipples protected with sterile gauze. The baby should nurse every six hours for the first day, then every three hours. The mother should sleep throughout the night unless the exigency is such that it is necessary for the baby to nurse, and then artificial feeding may be supplemented. Rest from responsibilities and worry are very important for the proper secretion of mill and anodynes and hypnotics are recommended for relief of pain and restlessness. "He who sleeps dines twice" is significant in the treatment of the mother after delivery.

The individualizing of cases is very important for the successful nursing of the baby. Sore and fissured nipples should be protected and given rest by using one gland if the other is more sen-

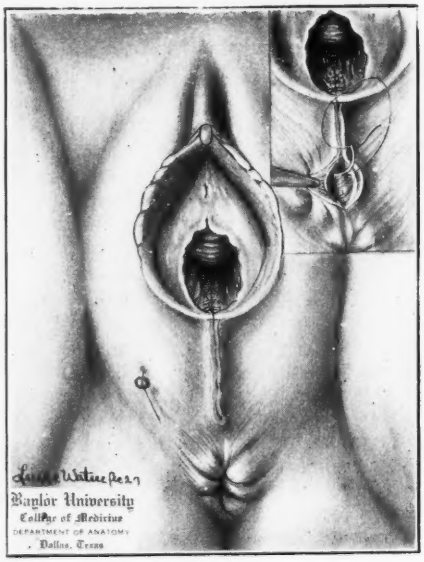

Fig. 6

Closing skin with subcuticular suture, either silkworm or chromic catgut. Suture starts above the hymen; continues down to lower end of incision and out through skin, away from anus. Silk held in place by lead bullet.

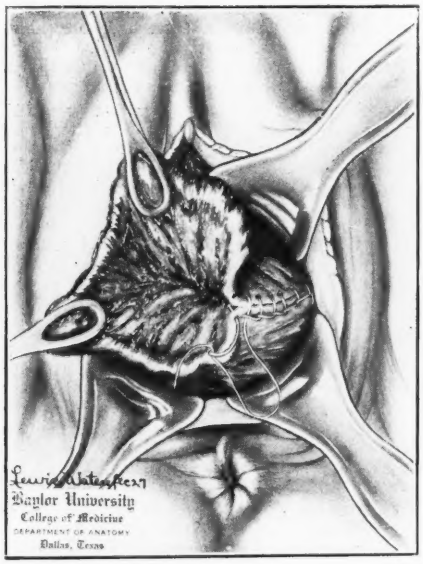

Fig. 7
Lacerated cervix showing repair immediately after delivery.

sitive. There are times when the nipple shield is useful and beneficial. The mammary glands are organs of habit and should function regularly in order to secrete their greatest quantity and quality of milk. Breast pumping is not natural; but should it be indicated, the mother or the nurse in many instances can be taught to milk the breasts, a method which, though not considered so esthetic, causes less traumatism and pain, and more nearly imitates nature. If the convoluted ducts which are bound together by connective tissue in each lobule were traced backwards, they seem to arise from groups of secretory alveoli; and if traced forward, they are found uniting forming fifteen or twenty lactiferous ducts, some of which open exteriorly by minute apertures through the nipple. The lactiferous ducts at the union with the lobular ducts are provided with sinuses rather than reservoirs for the collection of milk. The secretory cells of the lactating mammary glands have periods of rest and action. While a small quantity of milk is secreted during the period of rest, the greater amount is produced during the period of action, or while the baby is nursing. It is reasonable to calculate that only a small quantity of the milk is stored up between nursing periods, and the lactating mammary gland should be thought of as a secretory organ rather than a milk reservoir.

While in bed, the patients should be encouraged to change their positions, exercising their legs and arms, and have the "back rest" early. When the uterus descends into the true pelvis and the lochia has stopped, the patient may sit up and assume the knee chest position several times per day. Uterine bleeding three to six weeks after delivery usually is caused by a subinvoluted uterus which is best treated by rest, prone position, correction of any retrodisplacement and small doses of ergot and pituitrin. About the fifth or sixth week, the kangaroo walk and the mule kick should be recommended to be taken several times per day over a period of several months, or until the uterus retains its normal position. Polak says: "This is one of the most useful therapeutic measures in preventing retroversion and retroflexion and is invaluable as a prophylactic measure." The value of these exercises is not fully realized by the profession, and as the exercises are of infinite importance in the prevention of maternal morbidity and a reduction in the number of gynecological operations due to displacements following delivery, it is imperative that the medical profession recommend these exercises that good results during the puerperium may be obtained.

Patients who are suffering with tuberculosis, cardiovascular disturbance, nephritis or other constitutional complications will require special treatment during the puerperium as well as previous to delivery.

Patients whose weight is below standard after delivery should gradually increase their weight to standard; and those patients who are overweight after delivery should have a balanced diet to reduce their weight rather than cause any increase.

Walking is beneficial in returning tone to the abdominal muscles, Sensible shoes should be worn. High heels are unhygienic and unscientific, unbalance the body and throw it out of line, develop an artificial walk wholly in opposition to the natural carriage of the body and may cause spinal curvature or other deformities.

A pelvic examination should be made about the sixth week after delivery. If the uterus is not in position, it should be corrected and a pessary inserted. The pessary will not correct retroversion, but will assist in maintaining the position after the correction has been made. If the cervix is eroded, cauterizing with an electric cautery is more successful than painting with silver nitrate and the use of tampons. Cauterization is more satisfactory and certain, and usually

will heal the cervix of the infection. The occurrence of the first menstrual flow of the puerperium is usually profuse, and the patient should remain in bed until the end of this period. Rest during this menstrual period is a valuable treatment for the establishment of regular menstruation. The patient should be examined often enough during the puerperium to correct malpositions and early treatment should be instituted if operative gynecology is to be prevented.

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DISCUSSION (*Abstract*)

Dr. Willard R. Cooke, Galveston, Texas.—Hemorrhage from a relaxed uterus we have found almost universally controlled by large doses of pituitrin once an hour. If this does not control the hemorrhage then pituitrin can be injected into the uterine wall through the anterior fornix of the vagina, taking care not to enter a vein.

If there is one important thing in recent developments in the puerperal care of patients it is in the line of the bed exercises mentioned by Dr. Polak. We have almost as much success as he has in reducing puerperal retroversion. The incidence of retroversion in patients who do not carry out the exercises remains at 40 per cent; in those who do carry out the exercises it has dropped to 12 per cent; and in our last series to 10 per cent. If patients object to the more strenuous exercises they should be advised to take the knee-chest position and then raise the knees about six inches from the floor and come down with a jolt. This procedure is almost as effective as the others which Dr. Polak mentioned.

Every puerperal case discharged should be examined at the end of the fourth to the sixth week, preferably the fourth week; and if there are any lacerations they should be corrected. Dr. Polak mentioned the use of the cautery in endocervicitis. It is one of the most useful measures we have. I do not hesitate to cauterize thoroughly any exposed or everted mucosa.

The pessary is successful in 80 per cent of puerperal retroversions. A very essential point in regard to the use of the pessary is that reposition should be fully effected before it is inserted. Many men insert the pessary and expect it to turn the uterus over. It will not do it. The uterus should be brought forward and put in position and then the pessary fitted to the patient; and the patient should be examined a few days later to see that everything is in place and that the pessary is short enough not to cause discomfort.

I think that every patient who has had a baby should have a check-up examination and a blood count, preferably at the time of discharge from the hospital. In a great many of these cases the woman is surprisingly anemic and this can be corrected by the proper use of drugs and other treatment.

Dr. Walter E. Levy, New Orleans, La.—It was stated that the only recent advance in obstetrics was in prenatal work, that obstetricians were beginning to learn preventive medicine. I think with Dr. Polak and Dr. Hannah that the more recent advances have been in post-natal work. At Tulane we are attempting not so much to give the women prenatal care, although they do get that, but we try also to give them post-natal care, and our results have been very satisfactory. This includes also the correction of displacements.

One point in Dr. Hannah's paper that prompted me to rise is the condition of the bladder after delivery. We see cases that void anywhere from eight to ten times a day an ounce or two or three, and the bladder is continually rising. In one case which I saw ten years ago the bladder had risen considerably, the attending physician thought the uterus had risen, and in expressing the fluids he bore down and we had to repair a ruptured bladder. This full bladder lies at the top of the uterus and favors retroversion since as it rises it retracts the uterus.

Dr. L. A. Calkins, University, Va.—There is no doubt that a woman deserves relief from after-pains. It would seem, however, that the best treatment for after-pains is the prophylactic treatment. If you will massage the uterus one hour after delivery and then do a Crede expression, you will obtain from the uterine cavity an accumulation of blood clots and you will have about one case of after-pains where you would otherwise have five cases. In other words you will reduce the incidence of after-pains by approximately 80 per cent.

Another point about after-pains, is that they are roughly proportional to the amount of bleeding in the third stage of labor. They are inversely proportional to the contractivity of the uterus. If you will keep the uterus firmly contracted after delivery, you will materially reduce the incidence of the after-pains and the amount of the lochial discharge.

Dr. Hannah (closing).—I teach my patients to change their position frequently after delivery. If the patient is more comfortable on her side, she may assume this position because I believe she will rest better. Lateral and prone positions prevent blood from accumulating in the vagina, clotting, and acting as a medium for infection.

LEGG'S DISEASE IN ITS LATE STAGE*

By SOLOMON D. DAVID, B.A., M.S., M.D.,
Houston, Tex.

Much has been written about the so-called Legg-Calve-Perthes disease of the hip in its early stage in childhood. The symptomatology, physical findings and roentgenograms of the affected joint are characteristic. Here we have a child who began to limp and complained of either one or both hips, with certain variation as to the severity of pain and lameness. Usually the condition has been noticed during six months more or less. Physical examination will reveal slight atrophy and shortening of the affected extremity, slight limitation of internal rotation

*Read in Section on Bone and Joint Surgery, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

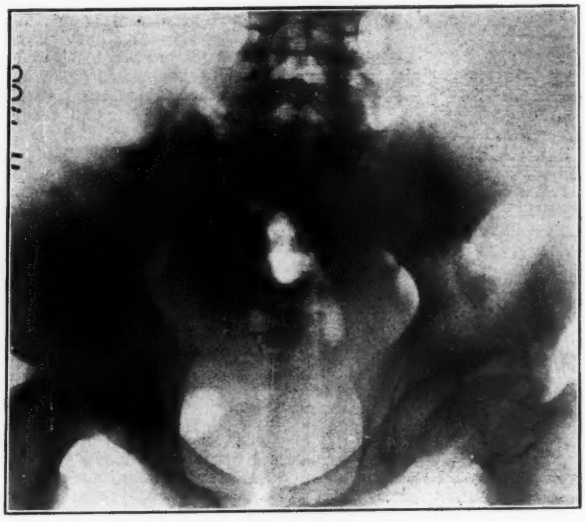

Fig. 1, Case 1

L. U. Legg's Disease. July 1924. Left hip showing flattening of the femoral head of the "Mushroom type." Neck is coxa vara and slightly thickened and short. Great trochanter high. Marked thickening and torsion of the acetabulum.

The patient, 35 years of age, was admitted to the United States Public Health Service Hospital No. 25, Houston, Tex., because of pain in his left hip. Examination of the hip showed no swelling, redness or tenderness, no pain on motion and no muscular atrophy, apparent or by measurement. Trendelenburg's sign was absent. Both great trochanters were above Rose-Nelaton's line. Both hips showed limitation of motion in abduction and internal rotation, but no shortening. Thus physical examination showed both hips alike, although the patient was seeking compensation from alleged trouble in the left hip contracted while in service. Radiograms revealed that the head of the right femur had melted away, leaving a cone-like structure in a very shallow but thick acetabulum. The neck was markedly hypertrophied and at right angles with the diaphysis. The left showed the femoral head of "mushroom type," the neck very short and slightly hypertrophied with an axis almost normal. The acetabulum was very thick and shallow. Thus, upon these findings compensation was denied.

Since the above report was made four new cases of flattened head of the femur in the adult came under my observation. Their ages range from 15 to 45 years.

and abduction. Trendelenburg's sign is positive. The great trochanter lies above Nelaton's line. Laboratory examination shows white blood cells either normal or slightly above normal. The tuberculin test is negative. Decisive evidence, however, is derived from the x-ray. The head of the femur appears altered, fragmented or mushroomed; the neck is hypertrophied and depressed; the acetabulum is shallow and thickened. Such is the picture of Legg's disease in childhood.

The terminal stage of this particular affection has not been fully understood. It may be that time has not been long enough to observe this ailment since it was first described by Legg in 1909. The picture of the hip in the late stage seems to be distinctly different from that in childhood. Is it reasonable to assume that certain cases of this disease subsequently develop chronic or degenerative arthritis with hypertrophic changes and the changes that occur in the shape of the femoral head in this latter disease are very similar to those found in Legg's disease?

In April, 1924, the writer read a paper on this subject before the South Texas District Medical Association, Galveston, Texas. One case in an adult was reported.

Fig. 2, Case 1

L. U., March 1926. Practically same as Fig. 1. Patient well and has no complaints as far as hip is concerned.

Fig. 3, Case 2
J. F. Legg's Disease in late stage. February 1926. Notice right hip as compared with the normal left. Markedly enlarged and distorted acetabulum.

The condition of one of them (J. F.) was diagnosed tuberculosis of the hip joint and consequently was treated with plaster spicas and traction. Also, another case (L. U.) was diagnosed tuberculosis of the hip. This conclusion was arrived at because of the positive history of familial tuberculosis of the patient, definite pulmonary involvement and the finding of acid-fast bacilli in his sputum. Despite all of these positive signs and findings this patient was suffering from osteochondritis deformans juvenalis.

No attempt will be made in this paper at discussion regarding the etiology and numerous theories advanced since the first report of the disease was made by Legg. Such detail as that will be reserved for another paper on this disease in childhood with report of cases, which the writer hopes to read before this Section at a future occasion.

REPORT OF CASES

Case 1.—The patient, L. U., 15 years of age, was a stationary clerk by occupation. He was seen by me in July, 1924. The father and mother were living, but neither was apparently in good health. He had two brothers and one sister living. One brother died with pulmonary tuberculosis at the age of 20. Six brothers and one sister died in infancy. The patient's sister developed definite pulmonary tuberculosis and had been a patient in county and state hospitals. The mother developed caries sicca of the right shoulder following a slight injury. One of his living brothers was recently admitted to the county hospital as a tuberculous patient.

He had had an adeno-tonsillectomy at 3, measles and chicken pox at 5, and there was no history of accident or injury. Physical examination showed him to be well developed and with marked pallor and a pasty, anguished appearance. He walked with the aid of crutches and a distinct limp. The left lower extremity showed slight wasting; the Trendelenburg sign was positive. Measurements were as follows: the right lower extremity, 36½ inches; left 35¼ inches. Abduction was very limited; adduction, negative. Internal rotation was limited; external rotation and flexion, negative. The great trochanter was above Nelaton's line. The temperature was 100° F.; pulse, 88 per minute, white blood cells 9200, and von Pirquet negative. Roentgenograms of both hips were taken (*Figs. 1, 2*). Supportive measures were applied to the left hip for three months. The left shoe was raised enough to enable the patient to walk without limping. I saw him a few weeks ago, fully recovered from his symptoms, which then consisted of low grade pain and articular irritability. This patient in the latter part of 1925 developed pulmonary tuberculosis, which was diagnosed by sputum examination. In 1926, an x-ray of the affected hip was taken to find out if the condition had changed (*Fig. 2*).

Case 2.—The patient, J. F., 25 years of age, was referred to me in February, 1926. Prior to this date he met with an accident that resulted in dislocation of the external semilunar cartilage of the right knee. His other trouble consisted of moderate soreness and rheu-

Fig. 4, Case 2
J. F. Coxa plana of right hip.

Fig. 5, Case 3

K. B. Legg's Disease in the adult. Head of femur appears cone-like structure with greatly hypertrophied neck which is forming right angle with femoral diaphysis. Slightly thickened acetabulum.

matic pain of the right hip of ten years' duration. The family history was negative. He had had measles, mumps and pertussis in childhood. For his hip condition he had consulted local physicians, who diagnosed it tuberculosis. Later he moved to another city, where two good physicians put him in a hospital under traction for one month and then in plaster spicas for seven months, at the end of which time he was allowed to get around with the aid of crutches. At present he is bothered with shortening, limitation of motion and dull, aching pain that comes on in remission influenced by atmospheric changes. Physical examination of the right hip showed slight atrophy and a prominent great trochanter. Palpation revealed capsular thickening, but no soreness on pressure. The great trochanter was above Nelaton's line. Trendelenburg's sign was positive. Abduction was moderately limited; adduction, normal; internal rotation, absent; external rotation, very restricted; flexion and hyperextension, negative. There was one-half inch shortening. Laboratory tests were negative. Radiograms showed a deformed head of the right femur (*Figs. 3, 4*). The patient was taken to the Methodist Hospital, where the dislocated external semilunar was removed. He made an uneventful recovery. The shoe of the left foot was raised and the patient discharged. He was seen by me three months ago and stated that his hip gives him no more trouble.

Case 3.—K. B., 31 years of age, was examined in April, 1926. His chief complaint was soreness in the left hip. About fifteen years previously he was seized with sudden pain in the hip following a jump and was forced to go to bed for three or four days. Upon arising he began to limp and was troubled with a constant dull aching. His back became bent and he had to use crutches for six months. In addition to the aching he complained of tilting of the pelvis, limitation of external rotation and abduction. The hip seemed to be sensitive to change of weather. Examination of the left hip showed apparent atrophy, slight tenderness under pressure and a bulging great trochanter that lay above Nelaton's line. Measurements brought out 1 inch shortening, 2¼ inch atrophy of the upper third of the thigh, and 1 inch of the lower third. Trendelenburg's sign was doubtful. Abduction was limited; internal rotation absent. The extremity was held in external rotation. Skiagrams showed deformity of the left hip (*Fig. 5*). A flannel spica was applied for three months and the patient became free of his symptoms. The left shoe was raised to correct the pelvic tilt.

Case 4.—Mrs. M. D., a white woman, 45 years of age, was married at the age of 12 in Tripoli, Syria. She had three children who were living and well. There was no history of tuberculosis, acute illness or accidents. She emigrated to the United States twenty years previously. Her chief ailment was pain in the right hip. This condition developed in her teens. It was characterized by sudden onset of a dull, aching feeling in the hip. No physician was consulted and the condition grew worse. During the acute stage she went to bed. At present her hip affection seemed to be variable. At times she was seized by sharp, acute pain to be followed by a period of lesser acute symptoms. She states that her hip is a barometer indicating atmospheric changes.

The patient was rather thin, walked with a distinct limp and moderate lordosis. The right hip showed 45 degrees flexion deformity, marked limitation of abduction and an internal rotation and slight degree of pain associated with motion. X-ray of both hips was

Fig. 6, Case 4

Mrs. M. D. Late Legg's Disease in the adult. Femoral head shows distinct arthritic changes.

taken (*Fig. 6*). The head showed definite degenerative and hypertrophic changes. One might assume that this case is, as pictured in the radiogram, infectious or hypertrophic arthritis. Such an assumption, unaided by the history of the case, may be true. Osteo-arthritis, as we have been taught and observed, is a disease of the middle or late period of life. This patient, however, had suffered from this condition for many years. Toxic or infectious arthritis, on the other hand, is usually polyarticular; the x-ray does not show formation of bone hooks or osteophytes in the latter.

DIAGNOSIS AND TREATMENT

It is exceedingly important in articular maladies to arrive at the proper diagnosis. Careful study of the history of the case and physical examination, with the aid of radiography, should leave no difficulty in the way. Tuberculosis has been mistaken for Legg's disease, and vice versa. The writer has observed two cases of partial separation of the upper femoral epiphysis treated in a manner similar to osteochondritis dessicans. Of course, no improvement was made by the patients. And it is infinitely important to differentiate between tuberculosis and Legg's disease, since the former has very guarded prognosis and protracted therapy.

The treatment of this disease is, in brief, the application of supportive measures whether by solid or semi-solid fixation. Correction of body mechanics should not be overlooked. In childhood if the symptoms are too severe rest in bed is indicated.

Regarding the treatment of *Case 4*, palliative measures did not relieve the condition permanently. This was expected and explained to the patient beforehand. Arthrodesis by the Smith-Peterson approach was resorted to a few weeks ago. It is too soon to formulate a report as to the exact result of this radical procedure.

CONCLUSIONS

The exact course of Legg-Calve-Perthes disease in childhood is fully known. Its recognition is very important. The differential diagnosis ought not to be difficult. The x-ray picture is conclusive. The question that confronts us is the ultimate fate of such a deformed hip. Does a patient suffering with this disease fully and permanently recover? Has the so-called proper care of this disease in its inception any bearing on its future course? And does *Case 4* of this small series represent the end result of an untreated affection? It is my aim to stimulate further reports from the profession in different regions.

Medical Arts Building.

DISCUSSION (*Abstract*)

Dr. W. Barnett Owen, Louisville, Ky.—There are only two points that I would like to discuss. The first is diagnosis, particularly the differentiation between Legg's disease in its late stage and tuberculous hip joint disease. We have outward rotation. The x-ray tells us that more than probably anything else. That is, it always shows a hypertrophy, flatness of the head, regeneration or proper limitation of the bone in the asteroid; whereas, in the tuberculous condition, we have located an absorption which is characteristic. In the onset and history there is not very much difference. In other words, we have pain in the hip, knee and limb of slow onset.

I do not think it is known just what is the cause of Legg's disease. Taylor described it as a quiet hip disease. It may be a low grade tuberculous infection.

We have always carried on the treatment of Legg's disease in children about like that of tuberculous hip joint disease, with rest and support.

Dr. David showed that adults of thirty-five or forty years have had Legg's disease since childhood and have been disabled for a greater part of the time. There is a question in my mind whether it would not be better in those cases to do an ankylosis operation, as he advised in tuberculous hip joint disease, because we could put the hip in the best possible condition and prevent abduction. We could prevent the loss of time due to the pain, the disability, which means quite a lot, and I believe that those cases should be ankylosed in the best possible position.

In the other cases we should avoid operative measures as long as is reasonable to hope for benefit and motion.

Dr. O. L. Miller, Charlotte, N. C.—Legg first reported this disease in 1910, seventeen years ago, and that was several years before work was very generally done on the condition, so we really haven't had the opportunity to follow cases on through to the condition shown in some of these slides. If we live long enough, we shall be able to tell positively whether or not these mushroom-head femurs are end-results of Legg's disease, after we have followed some cases for, say, a generation.

Anticipating that the end-result will be a disturbing pathologic condition, we should protect the hips a little more determinedly during the active phase of the disease.

Dr. Archer O'Reilly, St. Louis, Mo.—I think from looking at these pictures that the condition resembles arthritis, and pain is due more or less to faulty mechanics.

When this condition occurs late in life, if we diagnose it as an old periostosis disease, if the joint is irritable and constantly giving trouble, probably some type of ankylosis operation is the most desirable to make the patient comfortable by giving him a good, functional stiff leg, rather than one without force.

Dr. David (closing).—Operation is the last resort. The operability of Legg's disease is still in its experimental stage. My patient, who is 45 years of age, is, as far as I know, the oldest case reported in literature. As was remarked before, I am not positive that this is Legg's disease, but have arrived at this conclusion by elimination. At operation and after complete dislocation of the hip this structure was found to be mushy, soft and vacuolated. Practically the entire head

of the bone was removed before a normal bone was encountered. The acetabulum showed no abnormality. Now, if this case presents the terminal outcome of Legg's disease it may be then concluded that some of the cases of so-called hypertrophic or osteo-arthritis have started as coxa plana. It is hoped that more attention will be focused on some of these missing links.

FRACTURES ABOUT THE ORBIT*†

By WILLIAM D. GILL, M.D., F.A.C.S.,‡
Washington, D. C.

Fractures about the orbit constitute an important surgical problem because of their frequency and the disability they occasion.

The bones most frequently involved are the zygoma or malar bone, the superior maxilla, the frontal bone, the lamina papyracea of the ethmoid, and the lacrimal bone. The nasal bones do not properly belong in the group of bones composing the orbit and are therefore not considered in this article.

Fractures about the orbit are almost without exception the result of direct violence applied through the agency of firearms, sharp instruments, and blunt force, such as the fist. The last named has been the most frequent of these causes in our experience.

Fractures by indirect violence, or *contre coup*, are extremely rare and are usually due to force transmitted through the bones of the face or skull to those of the orbit. Le Grange[1] in an analysis of 609 cases of fracture about the orbit, found that there were only two cases clearly due to indirect violence. This observation corresponds with the experiences of other writers on the subject.

Fractures about the orbit may be single or multiple, and may be associated with wounds which convert them into compound types.

From a practical standpoint, fractures of the margins of the orbit and of the walls may be considered together because of their usual coexistence. Fractures of the lateral margin and of the lateral wall, due to involvement of the zygoma, are the most frequent type encountered. This bone forms approximately one-third of the lateral wall, two-thirds of the lateral orbital margin and about one-half of the inferior margin, and is therefore, most important. Frequently the target for blows with the fist, it is easily detached from its moorings and driven backward or inward toward the temporal fossa, through the application of this type of violence. There is always more or less contusion of the tissues in the temporal fossa; and, if the displacement of the fragment is pronounced, the coronoid process of the mandible may be impinged upon, thereby interfering with the movements of the lower jaw. Fracture lines radiating into the surrounding bones may open the maxillary sinus, the frontal sinus, or, even extend far enough downward to cause involvement of the alveolar process. In skulls having a wide transzygomatic diameter there may be an associated fracture of the zygomatic process of the temporal bone and an external angulation of the fragments. The sutures marking the articulations of the zygoma with adjacent bones, should be borne in mind; for slight separation at one or more of these points may be the only evidence of fracture in which gross displacement has not taken place.

Because of its proximity to the zygomatico-maxillary suture, and due to the additional fact that it traverses the floor of the orbit for a short distance in the infra-orbital canal, the infra-orbital nerve is frequently involved in frac-

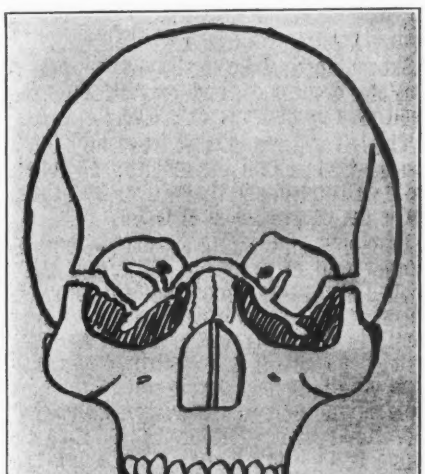

Fig. 1

The bones of the face and those of the cranium meet in the orbit. This junction point constitutes a potential weak area in the cranio-facial architecture. The accompanying illustration is a diagramatic representation of this juncture.

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†From the Department of Ophthalmology, Army Medical Center, Washington, D. C. Published with permission of the Surgeon General, U. S. Army who is not responsible for any opinion expressed or conclusions reached herein.

‡Captain, Medical Corps, U. S. Army.

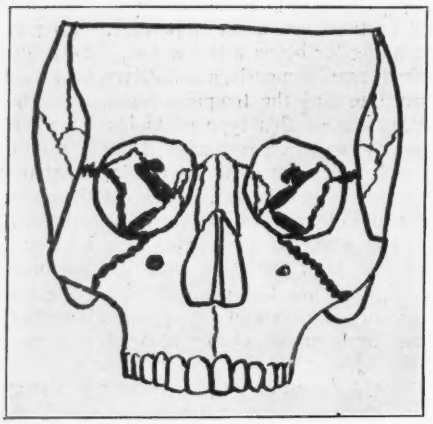

Fig. 2

Showing the usual location of fracture lines in fractures of the malar bone or zygoma, viewed from the front. Note the relatively large portion of the lateral orbital wall which this bone forms.

tures, suffering compression or laceration which gives rise to tingling sensations or numbness in the area it supplies.

Gross displacement of fragments, as well as massive infiltration of the orbit with blood, will seriously compromise the motility of the globe and may be responsible for its actual displacement.

Subconjunctival hemorrhage is of practically constant occurrence, and may be limited to a small area or be quite extensive.

The left zygoma is most frequently fractured, due to the fact that the majority of individuals are right-handed, and that a blow with the closed fist is the usual etiological factor.

Fractures of the inferior margin and of the inferior wall of the orbit are due to the same etiological factors producing fracture of the lateral wall. Marked displacement of the fragments in this type will result in an unsightly facial deformity if uncorrected; or, in displacement of the globe downward, with resultant diplopia and impaired motility. Emphysema of the orbital tissues may occur, but this complication is, in itself, harmless and subsides spontaneously within a week, leaving no residual abnormality.

The inconstant infra-orbital suture, which runs from the nasal extremity of the inferior orbital margin outward toward the infra-orbital foramen, may be responsible for a separate small fragment of bone becoming detached. Fracture lines may radiate into the alveolar process and give rise to serious dental complications.

Fractures involving the superior margin and the superior wall of the orbit are especially dangerous because of the proximity to the brain. They are usually due to the application of some violent force in the frontal region and are not infrequently due to self-inflicted gun shot wounds. When complicated by external wounds, these fractures are especially serious. They have certain symptoms in common with fractures already described; but in addition, there may be the added feature of injury to the cerebral tissue, the severity of the symptoms varying directly with the extent of the trauma. Symptoms of fracture in this region are essentially those of fracture of the *basis cranii*. The thin nature of the bone composing the roof of the orbit makes it particularly vulnerable and defects here, if sufficiently large may permit a herniation of the brain and meninges with the formation of an orbital meningocele or meningo-encephalocele. The frontal sinus is not infrequently opened by the fracture lines, and if infection be present in

Fig. 3

Showing edema of soft parts about the orbit following contusion. There was a badly comminuted fracture of the left zygoma and left superior maxilla in this patient. Injury incurred in a fight. Reduction under general anaesthesia with seizing forceps, with no residual disability, except tingling in area supplied by the left infraorbital nerve, which persisted for four months.

Fig 4-A
(Left)—Photograph made soon after receipt of injury and before advent of much edema. Note conspicuous depression due to displacement of fragment of left zygoma.

Fig. 4-B
(Right) — Photograph made after reduction with seizing forceps, under general anesthesia, and after subsidence of tissue reaction. Note that normal facial contour has been restored.

the sinus, extension to the meninges or brain may occur. Isolated fractures of the superior orbital margin are quite rare.

Fractures of the medial margin and wall are due to injury of the lacrimal bone, the lamina papyracea of the ethmoid, or the orbital plate of the sphenoid. The clinical characteristics of fractures in this region are orbital and palpebral emphysema, and epistaxis due to establishment of communication with the nasal cavity through laceration of the orbital periosteum and, of the nasal mucosa, or to involvement of the lacrimal sac, though the latter is not of frequent occurrence. These fractures usually result from light blows on the closed lids with the open hand, but may be accidentally produced during certain intranasal operations.

Fractures of the apex of the orbit are not frequent but constitute a serious type of injury because of the involvement of the optic nerve. In addition, the motility of the globe may be compromised from injury to the motor nerves or from interference with the extrinsic muscles. Fracture of the apex, as an independent lesion, is rare. It is usually due to extension of fracture lines from contiguous bones.

The eye may escape without injury, or damage to it may be quite serious. Visual function may be impaired or destroyed, and enucleation may be required because of the extreme nature of the traumatism. Corneal wounds, dislocation of the lens, traumatic mydriasis, iridodyalysis, intra-ocular hemorrhage, and lesions of the choroid and retina, such as detachment or rupture, may be mentioned as a few of the possible associated lesions of the globe. Laceration of the lacrimal sac from sharp spicules of bone, or obstruction of the sac or lacrimonasal duct from external pressure of the fragments may take place.

Diagnosis of fractures about the orbit is not always an easy matter. The prompt tissue reaction, associated with injuries about the orbit, acts to obscure the bony displacement; and the x-ray, unfortunately, is not always capable of demonstrating certain of these fractures. Inspection reveals the deformity associated with depressed fractures about the orbit if

Fig. 5
Unreduced fracture of left anterior antral wall and of left inferior margin of orbit. Due to kick from mule twenty years previously. Cosmetic disability constituting economic handicap to patient. No operation. The deformity is greater than is apparent in the photograph.

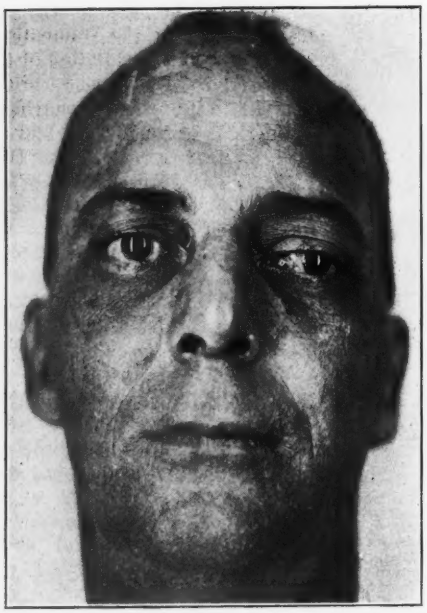

Fig. 6

Paralysis of superior rectus muscle and of internal rectus muscle of left eye with paralytic blepharoptosis, left side, due to fracture of apex of left orbit from radiation. Five months after receipt of injury. There has been marked improvement in eye condition since injury was received.

the patient is seen shortly after the receipt of the injury. Palpation is the method par excellence for demonstrating fractures of the margin of the orbit, and is best conducted with the examiner standing behind the patient and palpating both sides simultaneously. By this procedure, slight displacement of the fragments or sutural disjunction can be readily appreciated, even in the presence of considerable edema. Abnormal mobility and crepitus in fractures of the malar bone may occasionally be elicited by palpating the bone between the fore-fingers; one being introduced into the buccal fold underneath the bone, and the other being on the skin surface.

Equal sized pointers, or rods, pressed into firm contact with the malar bone on each side; and, at the same time, into firm contact with the sides of the head, will make slight depressions of this bone more evident through an outward deviation of the upper extremity of the pointer on the affected side.

Treatment of fractures about the orbit resolves itself into elevation of the depressed fragment, relief of pressure on important structures, and adequate treatment of associated wounds if they be present. In elevating depressed fractures of the malar bone, Matas,[2] applies traction to a silver wire suture encircling the bone. Codman,[3] uses a bullet forceps to seize the fragment and pull it into position. Wurdemann,[4] uses a strong resection hook passed around the bone to accomplish the same result. The author employs a heavy double pointed seizing forceps of special design to grasp the depressed fragment of bone through the skin. The instrument is modeled after an ordinary towel clip; but it is sufficiently heavy to enable the operator to exert the force required to reduce the fracture without breaking the instrument. In fact, an ordinary towel forceps can be used to advantage in reducing such depressed fractures provided the force required to effect reduction is not too great. It may be used in the presence of considerable edema with complete success. Palpation is used to determine when reposition of the fragment has been accomplished. Scarring is reduced to a

Fig. 7

Large subconjunctival hemorrhage associated with depressed fracture of right zygoma. Note that edema acts to obscure bony deformity. One week post-traumatic. Subsequent successful reduction with anatomical and functional restoration.

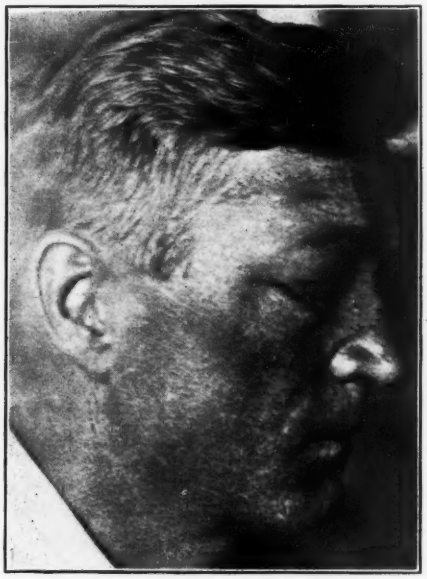

Fig. 8
Emphysema of orbital and palpebral tissues associated with fracture of the medial wall of the left orbit (lamina papyracea of ethmoid?) due to blow upon closed lids with open hand. Picture made six hours after receipt of injury. Expectant treatment. Emphysema subsided spontaneously in ten days leaving no residual abnormality.

minimum by the use of the above methods and when applicable, they are preferable to any type of open operation. They may even serve well when there is an associated external wound and are useful in reducing fractures of all the margins except the medial, not being adaptable to that location because of the nature of the bony structure. The fragment will usually remain in position without immobilizing appliances because of its serrated edges. Badly comminuted fractures and those reduced by open operation may require special retaining appliances as pointed out by Kizanjian,[5] though frequently such fractures can be satisfactorily reduced by the use of seizing forceps and may remain in position without immobilizing appliances through interlocking of the serrated ends of the fragments.

When the temporal process of the zygoma has been bowed outward, force to effect reduction is applied at the most prominent part of the deformity by tapping a padded piece of wood with a mallet, the wood being held in firm contact with the apex of the angulated bony structure. Traction applied anteriorly at the same time by means of a seizing forceps, aids in obtaining the reduction.

In depressed fractures of the antral walls and floor of the orbit, the depression may be corrected by opening the antrum through the buccal fold according to the method of Lothrop,[6] elevating the fragments with a blunt curved instrument and retaining them in position by packing the antrum with gauze, which may remain in position as long as a week. This method is objectionable because of the danger of infection through the mouth, but occasionally it is the only one which can be employed.

A modification of the Kronlein operation may be necessary to correct fractures of the lateral orbital wall and apex of the orbit. It should be borne in mind that operations of this nature leave unsightly facial scars and frequently the patient's resultant economic handicap from this source is greater than that which would result from the uncorrected fracture.

Fractures of the medial wall and margin may be corrected by intranasal manipulation, but it is usually best to treat such fractures expectantly as displacement of the fragments is usually slight, or nil; and the orbital emphysema subsides spontaneously within a week, leaving little if any evidence of injury.

Fractures of the superior wall of the orbit are especially dangerous because of the proximity of the brain and its covering which may be si-

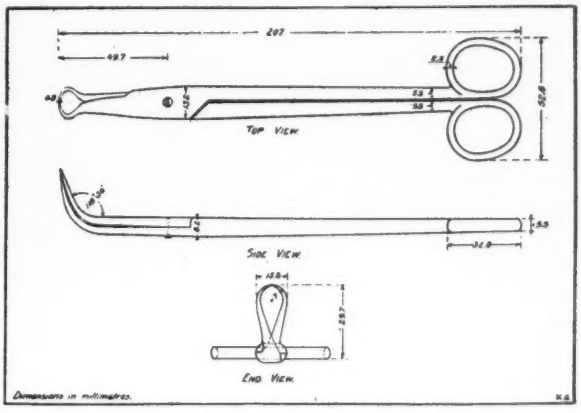

Fig. 9
Author's special seizing forceps used to elevate certain depressed fractures about the orbit.

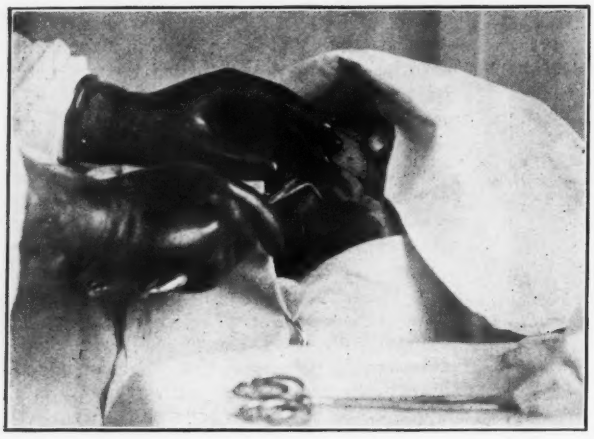

Fig. 10

Method of applying seizing forceps in elevating depressed zygoma. Note that mask acts to obscure patient's nose. Iodin skin preparation shows conspicuously. Five per cent alcoholic solution of picric acid is preferable to iodin for skin preparation. Note that left hand is palpating orbital margin while traction is being applied to the instrument to elevate fragment.

multaneously injured and give rise to symptoms of great severity. Treatment will be governed largely by the seriousness of the brain injury, and the treatment of fractures in this region is essentially the same as treatment of fractures of the base of the skull in general.

General anesthesia is required in reducing all types of fractures about the orbit, except those of the medial margin and medial wall, when local intranasal anesthesia may be satisfactorily employed.

Contusion of the tissues in the temporal fossa results in considerable distress in masticating during the post-traumatic period; and, to lessen this discomfort, it is best to limit the patient to foods requiring a minimum effort at mastication.

Tingling along the distribution of the infra-orbital nerve is a troublesome sequel and present in a large percentage of patients. It may persist for three or four months before subsiding, and little can be done to relieve it. The fact that reduction has been accomplished and pressure on the nerve relieved, has no definite relation to the duration of this distressing complication.

Infection occurring in compound fractures may lead to an osteo-myelitis which will further prolong the treatment and may necessitate additional operative measures to overcome it.

The period required for healing in simple fractures is approximately six weeks. In complicated fractures a longer period of time is required.

Fractures involving the alveolar process call for cooperation with a dental surgeon competent to treat such fractures.

Enophthalmos is occasionally a sequel of injuries about the orbit. It is ascribed to a paralysis of the orbital muscle of Müller, from lesions to the sympathetic nerves, or to an atrophy of the orbital fat. It may come on soon after the injury, or it may be late.

Exophthalmos is attributable to retro-bulbar exudates, hemorrhagic or otherwise; to actual crushing of the orbital walls; or to contraction of cicatricial bands.

Old depressed fractures of the orbital margin can occasionally be pulled back into position with the aid of a seizing forceps, providing not more than two months have

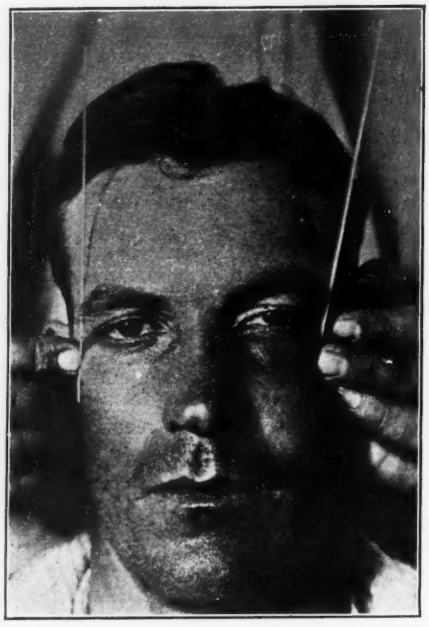

Fig. 11

Equal sized pointers applied to sides of head and pressed into firm contact with each zygoma. Outward deviation of the upper extremity of the pointer on the affected side makes the depression more evident. Same patient as Fig. 4-A and 4-B.

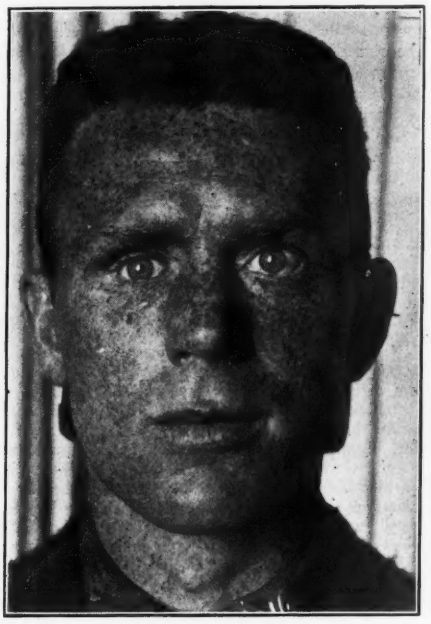

Fig. 12

Enophthalmos, rt. eye, due to atrophy of orbital fat, appearing three months after severe fracture involving superior maxillary bone, rt., and inferior and lateral margin and wall of the right orbit. Injury due to airplane crash. Diplopia present in certain positions of the globe.

elapsed since receipt of the injury. If the callus is firm it may be possible to open the fracture line with a chisel, introduced through a small skin incision, and elevate the depressed fragment by traction. It is usually necessary to retain the fragment thus reduced in position by some form of anchorage, such as a silver wire suture.

In the treatment of healed, irreducible, depressed fractures associated with marked cosmetic disfigurement, various plastic procedures are called for. The orbital margin may be restored by cartilage or fascial transplants; and deformity, resulting from depressions in the region of the zygoma, may be corrected in a similar manner. The temporal muscle swing of Gilles' is, at times, of great service in correcting the latter type of deformity.

SUMMARY

(1) Fractures about the orbit should be diagnosed early and appropriate treatment applied in order that the cosmetic disability, functional impairment, and economic hindrance to the patient be minimized to the greatest degree.

(2) Complete functional and anatomical restoration is attainable except in the most serious cases.

(3) Closed reduction is the method of choice when applicable.

(4) Dental complications call for co-operation with the dental surgeon.

(5) Old fractures offer limited opportunity for the patient to obtain cosmetic, anatomical, and functional restoration. Correction of the cosmetic disability may be the only one of this triad that is attainable.

TABLE 1

Summary of causes producing fractures about the orbit, based on an analysis of 47 cases:

Gunshot wounds	8
Motor vehicles, (automobile and motorcycle)	9
Airplane accidents	4
Blows with the fist	15
Other blunt instruments	10
Sharp instruments, (ax)	1
Total	47

TABLE 2

Bones involved in 47 fractures about the orbit. The bone showing the chief involvement has been used as the basis for classification:

Zygoma, or malar bone	25
Superior Maxilla	8
Frontal	7
Ethmoid, (lamina papyracea), medial wall fractures	4
Multiple fractures including fractures of the apex of the orbit	3
Total	47

TABLE 3

Complications and sequelae observed in 47 cases of fracture about the orbit.

Subconjunctival hemorrhage	30
Infraorbital nerve involvement	15
Muscle imbalance, above 2 degrees (Diplopia in 5 patients).	8
Intra-ocular hemorrhage	5
Amblyopia exanopsia, (old fracture)	1
Section of optic nerve	
Unilateral (Gun shot wound)	1
Bilateral (Gun shot wound)	1
Loss of globe, (enucleation necessary because of injury.)	3
Lacrimal sac and lacrimonasal duct, (injury to)	2
Suppurative meningitis following fracture of roof of orbit and frontal bone, with fatal termination	1
Enophthalmos, (atrophy of orbital fat)	2
Dental complications (fracture into a veolar process)	4
Emotional instability, (post-concussion syndrome)	2
Drug addiction	1
Headache, severe, persisting longer than 2 weeks	2
Section of recurrent laryngeal nerve, Rt. associated with gun shot wound fracture of both orbits	1
Intracranial foreign body, fragment of cartridge case—successfully removed	1
Associated external wound, (including gunshot injuries)	15
Emphysema of orbital tissues, (all fractures of medial wall of orbit)	4
Sebaceous cyst, large, over site of fracture	1
Pneumonia, associated with foreign body in chest, (bird shot). (Recovery)	1
Sympathetic ophthalmitis with severe injury to both globes. Globes retained, patient desensitized with uveal pigment	1

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DISCUSSION—(*Abstract*)

Dr. E. H. Cary, Dallas, Texas.—Of the many important things which might follow fractures about the orbit, I wish to emphasize two important sequelae: one, abscess of the brain as a result of infection, and the other, sudden blindness.

Dr. Joseph D. Heitger, Louisville, Ky.—Prognosis is very difficult in these cases, because of the involvement of the optic nerve and the damage that may occur from pressure, from retraction, and the effect on the motility of the eyeball, the possible involvement of the brain and dura; and another point which is not at all insignificant, is the cosmetic effect. A certain number of these cases if improperly treated in the beginning show retraction afterwards, and a deformity which in some instances interferes with the possibility of the individual's acquiring employment.

This past summer four rather rough looking individuals appeared at my front door one night, bringing a former patient who had been on a spree for several days. He had been struck over the eye with an ice pick half an hour before, which apparently separated the lacrimal sac and punctured somewhere on the inner wall of the orbit, going through the nose and over into the ethmoid on the opposite side. He had some emphysema and subconjunctival hemorrhage and blood clots on both sides of the nose, and was almost anesthetic from shock. I told him to report to my office in the morning. I did not see him until two months later, and he had apparently suffered no ill effects whatever.

Another case was a young man who had been struck by a pair of brass knucks. The whole left side of his eye was closed, with considerable hemorrhage and emphysema. Afterwards he had a fair functioning nose.

Another shows how an apparently insignificant trauma may effect a rather unfortunate result. During the night, two days before I saw this patient, his wife apparently in a nightmare, struck his eye with her elbow. Two days later his vision began to be very hazy, and in spite of everything I could do the condition went on to optic atrophy and complete loss of vision.

This modification of the seizing forceps which Dr. Gill has described, and the method of closed reduction I think will be useful to all of us.

Dr. H. Moulton, Fort Smith, Ark.—I wish to speak of the possibility of neuralgia following these fractures of the rim of the orbit. Of course if any branch of the supra-orbital or orbital nerve were destroyed there would be no neuralgia, but when they are included in the cicatrix they are a source of neuralgic pain that will persist a long time afterwards. I remember one case in which the outer third of the superior rim of the orbit was injured and there was quite a little displacement of the fragment. It was a compound fracture and after replacing the fragment and uniting the wound these severe pains persisted, even though the healing was apparently complete. The pains were relieved finally by chiselling away a little bone at the point of union of the fragment with the undisturbed bone. The pain was completely relieved by that procedure.

Dr. G. Madison Maxwell, Roanoke, Va.—There came to my office a week ago a twelve-year-old child who had been suffering for eight years with internal squint, and who had been wearing glasses that corrected the squint. A month before she was knocked down by an automobile, with a resulting fracture somewhere about the orbit; also in the base of the skull. She lay unconscious for three days and then gradually began to get well, with a double suppurative otitis media which still persists in one ear, and a paralysis of the external rectus muscle of her better eye following the fracture. I have hesitated as to whether to try to find the pressure on the nerve and relieve it, or to let the case go on, since it is doing well and she has good vision in that eye. The other eye has very poor vision.

Dr. Clifton M. Miller, Richmond, Va.—None of the speakers has spoken of preventive treatment. When a patient comes to me with an open wound he is at once given an injection of anti-tetanic serum, both for the specific effect and for its effect as a foreign protein.

Dr. Gill (closing).—These slides show certain points which are considered important in connection with the diagnosis and treatment of fractures about the orbit. One of the patients in this series had a condition similar to that described by Dr. Maxwell, except that in the patient whose picture we shall show, the sixth nerve lesion was on the same side as the orbital injury. In Dr. Maxwell's patient the fact that the sixth nerve paralysis was on the side opposite the orbital injury indicates to my mind that the lesion responsible for the paralysis was either central or due to involvement of the peripheral portion of the nerve in an associated basal fracture line, most probably the latter. It would be interesting to know whether there was an associated seventh nerve involvement on the same side as the sixth nerve paralysis. The possible existence of Gradenigo's syndrome should also be borne in mind because of the middle ear suppuration.

If we are fortunate enough accurately to localize the point of pressure on the sixth nerve, we may be able to relieve it operatively, but this is rarely the case. We are usually justified in treating such patients expectantly as the tendency is toward recovery, which is usually complete, unless there has been gross injury to the sixth nerve. Recovery may be delayed three months or more, so one should not become discouraged too soon in such cases.

THE PATHOLOGY OF CERTAIN VIRUS DISEASES*†

By E. W. Goodpasture, M.D.,
Nashville, Tenn.

The lesions of some of the diseases which are due to filterable viruses are characterized by the presence of peculiar structural changes within certain cells. These changes are of the nature of inclusions, that is, bodies which appear in the cytoplasm or nucleus which are different from any of the normal constituents of the cell, and different from the degenerative changes otherwise found in such cells.

For the sake of orientation several of the virus diseases which have intracellular inclusions are enumerated.

Diseases associated with specific inclusions:

I In the cytoplasm:
- (a) Fowl-pox or epithelioma contagiosum.
- (b) Mollusum contagiosum.
- (c) Sheep-pox.
- (d) Trachoma.
- (e) Rabies.
- (f) Fowl pest.
- (g) Hundstaupe or nervous distemper of dogs.

II In the nucleus:
- (a) Herpes simplex.
- (b) Herpes zoster.
- (c) Varicella.
- (d) Borna's disease of horses.
- (e) Carp-pox.
- (f) Virus myxomatosum in rabbits.
- (g) Polyhedral disease of caterpillars.
- (h) Foot and mouth disease.

III In both cytoplasm and nucleus:
- (a) Small pox.
- (b) Vaccinia.
- (c) Paravaccinia.

There are several other important virus diseases in which no inclusions have as yet been discovered in the lesions. Among these are poliomyelitis, which belongs to the neurotropic group along with rabies and herpes, and Rous' chicken sarcoma and fowl leukemia, which simulate the tumors. To these may be added the bacteriophage of D'Herelle, and the virus of mosaic disease of tobacco, whose activities closely resemble those of enzymes.

The presence of cellular inclusions in the lesions of many of the above mentioned diseases, is only one of several distinguishing features which seem to relate them. In general,

(1) Their respective viruses are filterable through earthenware or porcelain filters.

(2) The viruses may be preserved in glycerine and some of them are very resistant to drying.

(3) They seem to have a tissue specificity, namely: small-pox manifests itself in the skin, rabies in the central nervous system.

(4) None of these viruses has been cultivated with certainty outside the body, and living tissue seems to be necessary for their reproduction.

(5) The recovery from a virus disease is usually associated with a lasting immunity.

(6) The viruses in general may undergo biological variations, so that relatively avirulent strains of some of them are used for the induction of immunity through vaccination (small pox, rabies).

The active agents of many of the virus diseases have at various times been considered to be animal parasites, plant parasites, bacteria, toxic substances and enzymes. From a histo-pathological standpoint etiological investigations have been concerned with the demonstration of and interpretation of the specific intracellular inclusions.

Perhaps the widest generalizations concerning these bodies have been that they are composed in part of virus which is surrounded by an envelop of material representing reaction products of the cell. Von Prowazek, who has elaborated this conception, regarded the visible inclusions as the material supplied by the cell. He used the generic name *Chlamydozoa* (or manteled micro-organisms) to designate the group. Lipschutz, following the demonstration of certain minute bodies in the cells and in smears from the lesion, which he regards as the parasites, used the term *Strongyloplasma* to distinguish this group.

For the past year studies have been in progress in our laboratory upon one example of the filterable virus diseases which offers an excellent opportunity to investigate the nature of the specific cellular inclusions. This disease is epithelioma contagiosum of fowls or fowl-pox.

This is an eruptive disease of fowls more frequently seen in chickens and pigeons. In the spontaneous disease, after an incubation period of about four to six days, the most characteristic

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†From the Department of Pathology, Vanderbilt Medical School.

clinical feature, the cutaneous eruption, appears usually upon the unfeathered parts of the body. It is observed particularly about the head, affecting the comb, wattles, ear lobes, eyelids, nares and angles of the beak. It may also appear on the legs and feet, under the wings and about the anus. The cutaneous exanthem is characteristically nodular. When first noticeable the nodules measure less than 1 mm., appearing grayish or pink, circumscribed, firm, and seemingly deep-seated. They may be very numerous or few in number; and they do not all erupt necessarily at the same time. Rapidly enlarging and becoming more elevated during a period of a week or more, they assume the appearance of warts attaining a size of about 0.5 cm. Sometimes they remain more or less flat. Closely adjoining lesions may coalesce. The larger developing lesions appear rough, gray, yellow or dirty brown in color. The surface may be moist for a short time but soon dries superficially. After about two weeks of development, sometimes sooner, the nodules may show evidences of inflammation at their base. They then frequently become hemorrhagic and begin to dry, assuming an irregular dark brown or black, scabby appearance. The process of dessication and scab formation lasts for another week or two. If the crust be removed in the meantime a moist seropurulent exudate is found beneath, covering a bleeding, granulating surface. Eventually the large, brown or black, hard, shrunken crust drops off leaving a smooth scar. In milder lesions there may be no noticeable scarring. The lesions about the eyelids are often very extensive, involving the margins of the lids, partially or completely closing the aperture. There may be an associated purulent conjunctivitis or keratitis with destruction of the cornea. At the angles of the beak the lesions usually become infected with micro-organisms from the mouth and present a whitish or dirty gray, opaque, necrotic, flat surface which is moist and membranous. Neighboring lightly feathered parts of the head may be affected, sometimes the upper parts of the neck. Reischauer mentions the occurrence of disseminated and generalized forms of the eruption affecting wider areas of the skin. In geese, lesions appear upon the webs of the feet.

Besides the skin, all the visible mucous membranes may be affected, but particularly those of the mouth, nose, and pharynx. Lesions in the cloaca are mentioned. The eruption may occur at any point on the visible mucous surfaces. They first appear as white, opaque, slightly elevated spots one to two millimeters in diameter. The lesion rapidly increases in size, may coalesce with others, becomes ulcerated and covered with a white or yellowish, cheesy, necrotic material, which is probably the result of secondary infection with a variety of micro-organisms. If the lesions be extensive the entire pharynx and even the larynx may become involved, and eventually filled with a membrane of micro-organisms, necrotic material and exudate. The membrane may resemble that caused by the Klebs-Loeffler bacillus, and much effort has been expended in an attempt to establish the true relationship of fowl-pox to avian diphtheria. The mucosa of the nose becomes inflamed, and the air-passages occluded by exudate, resulting in great difficulty in breathing. In fatal cases obstruction to air-passages often seems to play an important part by interfering with breathing, and the terminal stages are frequently associated with a deep cyanosis. At autopsy one may find lesions on the mucosa of the pharynx, esophagus and crop similar to those in the mouth.

The general symptoms which accompany the eruption and become progressively worse as the disease develops, are loss of appetite, dullness, ruffling of the feathers, emaciation and pallor of the comb and wattles. An accompanying elevation of temperature is questionable. The cachexia increases and often becomes extreme. In fatal cases cyanosis appears and death occurs about four or five weeks after the beginning of the infection. Bollinger thinks the immediate cause of death in many cases is an interference with breathing. The mortality is dependent upon the situation of lesions in the throat, according to Csokor. No doubt secondary invasion by bacteria and other micro-organisms sometimes contributes to the fatal outcome (Reischauer). At autopsy no specific changes have been observed in any internal organ or tissue.

In the event of recovery the superficial lesions dry up and begin to fall off after the fourth or fifth week, and the animal begins to recover its appetite but may remain emaciated for several weeks, gradually returning to a normal condition. Recovery from an attack is associated with an immunity.

The virus of fowl-pox is present in enormous quantity in the skin lesions. A slightly cloudy suspension of a nodule ground in saline is infective in a dilution of 1-2,000 (Burnet). Consequently scraping from the lesions or the dried crusts separating from them offer a rich and extensively used material for experimental inoculation. Material from early lesions of the mu-

cosa are also highly infectious, but are not so suitable for an inoculum because of the abundance and variety of micro-organisms, and the absence of dessication *in situ*. Notwithstanding the negative results of Reischauer with blood and lymph, Loewenthal, Burnet, Lipschutz and Sanfeliece fairly regularly found the blood to be infectious even after recovery from the disease. Sanfelice noted that the blood was most infectious at the height of development of the cutaneous lesions, thereafter gradually diminishing in virulence.

As might be expected, with virus circulating in the blood stream, many of the internal organs have been shown to contain the infectious agent. Loewenthal successfully inoculated pigeons with liver emulsion. The skin everywhere contains virus and the brain and nerves were found to be virulent by Lipschutz. Sanfelice demonstrated virus in the spleen, lungs, liver and kidney, in the last two organs 24 hours after a successful inoculation upon the skin. It was likewise present in the internal organs 71 days after inoculation. The ovary was virulent in the experience of Levaditi and Nicholau. Lipschutz points out, that fowl-pox must be considered a generalized infection and not merely a skin disease as was presumed by earlier writers. Probably all the organs and tissues harbor the virus, but only the cells which possess an especial affinity are able to localize it, so to speak, and to manifest a reaction to its presence.

The disease is easily inoculable upon the skin of fowls of the same species from which the virus comes. Slight scarification or the injury caused by plucking feathers offer receptive foci to the virus. Intravenous inoculation of the virus causes an eruption on the unfeathered parts quite like that of the spontaneous disease. Following an intravenous inoculation the virus will localize in cutaneous foci which are injured as by scarification or the plucking of feathers.

In an attempt to determine whether or not the specific intracellular bodies of fowl-pox are derived from any demonstrable cellular constituent the writer has made a study of their origin and mode of development within the cell.

The virus used was a strain derived from a case of spontaneous fowl-pox sent to us by Dr. Beaudette of the New Jersey Agricultural Experiment Station. When inoculated on the scarified skin of a susceptible chicken a lesion develops to its height on about the sixth day. Pieces of tissue excised from the developing lesion have been the material studied. As with molluscum contagiosum the best fixative for the study of the affected epithelial cells was Regaud's fluid for twenty-four hours, followed by a mordanting in 3 per cent potassium bichromate for three to four days. After this fixation the intracellular virus-bodies are differentially stained a deep blue with Mallory's phosphotungstic-hematin stain. For the demonstration of mitochondria the acid-fuchsin methyl-green method has been employed.

The changes in epithelial cells develop very similarly to those which take place in the lesion of molluscum contagiosum. The well-developed lesion, consists essentially of an epithelial hyperplasia involving both epidermis and underlying feather follicles. There is more cellular reaction in the subcutaneous tissue than is found in molluscum contagiosum. The basal layer of epithelium shows little change from the normal. Peripheral to the basal layer the earliest stages in the development of virus-bodies appear. The cells in which they occur are enlarged and the cytoplasm is abundant. The mitochondria are thread-like and larger than in the cells of the basal layer. The material constituting the virus-body appears first about the periphery of one or more vacuoles commonly situated at the proximal pole of the cell. In suitably stained preparations it has the appearance of an amorphous granular substance, and may be stained lightly with osmic acid. One or several vacuoles may occur in the same cell. Nearer the surface the altered cells become yet larger and there is evidence of a change in position of the virus-bodies, so that they come to lie more frequently at the distal pole of the cell. Extruded nucleoli appear within the cytoplasm, and they can be sharply distinguished morphologically and tinctorially from the virus-bodies. They are spherical, sharply outlined masses without a central vacuolation, possessing a basophilic reaction, so that they stain blue in contrast to the deep red of the virus-bodies, in acid-fuchsin-methyl-green preparations. The mitochondria become fragmented and granular, and it appears that particles of their substance may adhere to the virus body.

The virus body increases rapidly in size. Its outline in fixed preparations becomes irregular and coarsely granular obscuring the original vacuole. As the surface is approached the cells show evidences of disintegration. The mitochondria become granular and vesicular, the nuclei shrunken and irregular in their staining reactions. The virus body becomes separated more or less from the cellular cytoplasm by

fluid, as if the cytoplasm were undergoing a hydropic degeneration. On the surface there are great alterations of the cells from dessication, the presence of bacteria and other external influences.

Throughout its residence within the living cell the virus-body increases in size until its volume may become as great as that of the original cell. Its enlargement is due to a generation of its essential substances, and there is no evidence that these substances are derived from any demonstrable cellular constituent except perhaps a small amount of mitochondrial material which may become adherent and incorporated with it.

If the surface of such a lesion be slightly scraped and the scrapings moistened with water and pressed under a coverslip, the virus-bodies may be easily recognized under the microscope. When they are pressed out thin beneath the coverslip they are seen to be composed of myriads of minute bodies which seem to be agglutinated by a viscous material between them. In smears stained with Loeffler's flagella stain, or better with carbol-anilin-fuchsin for 1 minute, after mordanting an equal period with 1 per cent potassium permanganate (Goodpasture) they are readily demonstrable. They are round or slightly oval, sometimes arrange in short chains or in diplococcal and biscuit forms. They are colored a faint but distinct pink, and are gram negative. These bodies may be equally well studied in dark field preparations. They measure about 0.25 micron in diameter, and have the appearance generally of a minute, non-motile micro-organism.

The ease with which they may be demonstrated in smears stained by the carbol-anilin-fuchsin method makes it a simple matter to follow them in various culture media. The striking morphological similarity to a living organism and the readiness with which they may be demonstrated should make them serve as a logical point of departure for cultural investigations. and studies of their reactions under various circumstances.

In unpublished work in the writer's laboratory, in conjunction with R. C. Avery, the observations of Borrel, Burnet, Lipschutz, da Rocha-Lima and others regarding the presence of the coccus-like bodies in the lesion have been completely confirmed. It has further been possible definitely to associate them with the specific cellular inclusions. Briefly the inclusions examined in fresh preparations are found to contract in hypertonic salt solutions and to swell very greatly when placed in distilled water, like a cell with a semipermeable membrane. In the swollen state they appear to be composed of several coherent globules of fluid held together apparently by a semi-permeable albuminous material. Within the largest globules the minute bodies are to be clearly seen in myriads dancing in an exceedingly rapid Brownian motion. On the readdition of salt solution they rapidly contract becoming again hyalin. When compressed the mass ruptures, still remains coherent and is uniformly finely granular. In the fresh preparations the uniform minute bodies which have become extruded are very easily seen. On staining such a preparation the compressed inclusions are found to be composed of the Borrel bodies mantled by a gelatinous material in which they lie; and their staining property seems to be totally or partially dependent upon the envelop of this material which adheres to them.

It has likewise been shown that these minute structures are easily demonstrable in the dried scabs six months after dessication, by soaking the scab in distilled water twenty-four hours and making smears. Likewise they appear as characteristically after preservation in glycerine. On the other hand under conditions which destroy the virus, such as incubation at 37° in saline for 10 days or two weeks, the addition of potassium hydroxide, prolonged putrefaction, the bodies disappear apparently coincidently with the virus. It is possible to procure a fairly pure suspension of the unruptured inclusions, for the most part free of cells. In such a suspension, washed and centrifuged several times in physiological salt solution, the supernatant fluid proved to be entirely inocuous, while the sediment was highly virulent. Thus the virus is associated with the inclusions, as Remlinger many years ago demonstrated to be the case with the sediment of rabic cord.

At least from a morphological standpoint a thoroughly logical hypothesis has been evolved which seems to harmonize with the known facts about the virus of fowl-pox. This hypothesis would interpret the specific cellular inclusions to be aggregations or colonies of a tiny coccoid micro-organism held together in a zooglial mass by an albuminous material which is usually associated with a lipoidal constituent.

The evidence seems to the writer preponderant that the minute bodies, which are the essential components of the intracytoplasmic structures peculiar to the lesions of contagious

epithelioma, are in reality living agents, for the following reasons:

(1) These minute bodies constitute the bulk of the cellular inclusions, consequently these structures may be regarded as colonies of the virus.

(2) Suspensions of virus bodies centrifuged at high speed and washed several times shows the active agent to be associated in the sediment with the virus body. The supernatant fluid is sterile.

(3) The minute bodies under certain unfavorable circumstances disappear apparently coincidently with the virus.

(4) They may be demonstrated in dried scabs and tissue preserved in glycerol. The bodies are therefore morphologically resistant to the same conditions as the active virus.

(5) The minute bodies are filterable through a Berkefeld filter (da Rocha-Lima).

(6) Their abundance in the lesions would explain the virulence of this material in high dilution.

(7) The capsular material about them would explain the difficulty with which they are filtered, and their resistance to certain chemical agents.

Cultivation on artificial media of these bodies remains to complete the chain of evidence.

SURGICAL TREATMENT OF DISEASES AND INJURIES OF THE BLOOD VESSELS*†

By J. L. CAMPBELL, M.D., F.A.C.S.,
Atlanta, Ga.

The use of autogenous fascia bands in the treatment of:

(1) Five aneurysms of the common carotids, one pulsating exophthalmus, one re-enforced popliteal ligation, and two re-enforced suture lines.

(2) A review of the location, treatment, and end results in fifteen vessel injuries.

It is my purpose in presenting this paper to discuss a group of cases selected from my service in the Emory University division of Grady Hospital, first, emphasizing the use of detached autogenous fascia bands and, second, giving a review of a series of wounds of the larger surgically accessible vessels.

The use of autogenous fascia bands is indicated: (a) where it is necessary to preserve a certain part of the lumen of an artery without injury to the vessel (as, for instance, when it cannot be demonstrated that the collateral circulation is capable of maintaining the vitality of the areas supplied by the vessel); (b) to re-enforce the suture of a vessel wound; and (c) to re-enforce a ligature on, or to ligate, a degenerated vessel.

In an article which appeared in the November, 1926, issue of the SOUTHERN MEDICAL JOURNAL my method of applying detached fascia bands was described, and at a clinic[2] before the Southern Medical Association I had the opportunity of presenting two aneurysms of the common carotid in which I had used this method.

Up to the present, I have used fascial bands nine times:

(1) For incomplete occlusion of the artery in five aneurysms of the carotids;

(2) Once in a traumatic pulsating exophthalmos of the right eye;

(3) Once to re-enforce the ligation of a degenerated popliteal artery proximal to a large aneurysm;

(4) To re-enforce the sutures in two arterial wounds.

In this group, there were eight men and one woman. Five of the six aneurysms (4 carotids and 1 popliteal) and the pulsating exophthalmos were cured, although in one of the carotid aneurysms the patient had a temporary hemiplegia, which began forty hours after the operation. However, this has since cleared up and he is now well, both of the paralysis and the aneurysm.

In the fifth carotid aneurysm there occurred several unique features which seem worth relating:

D. S., a colored female, age 29, came to the emergency clinic on March 27, 1927, complaining of a painful lump on the right side of her neck, sore throat, difficulty in swallowing, and inability to open her mouth. The clinic surgeon sent her to the otolaryngological service with a diagnosis of peritonsillar or retropharyngeal abscess, but the house surgeon recognized the supposed abscess as an aneurysm which had ruptured and infiltrated the peritonsillar area and soft palate, allowing a small quantity of blood to escape.

Considering the condition urgent, we operated at once, using a local anesthetic. The artery was exposed just below the sac and incompletely occluded by passing around it a band of fascia 1 cm. wide. It was

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†From the Surgical Service of Emory University Division of Grady Hospital.

drawn just tight enough to stop the pulsation, thrill, and bruit in the sac. Careful watch for cerebral symptoms was maintained but, as none appeared, the wound was closed.

A few days later, her convalescence was interrupted by the development of a severe stomatitis which lasted for three weeks. During this time, a soft bruit returned in the lower pole of the sac, but the swelling in the throat almost disappeared and she was able to open her mouth much better. There was, however, very little or no change in the size of the sac when she left the hospital 42 days after the operation.

July 1, she was re-admitted with a well marked pellagra, which required two months' treatment. By the last of August, as there was still no change in the aneurysm, she consented to have a second operation. Under local anesthetic the artery was again exposed, but the site of the fascia band could not be definitely located. However, the vessel was only about half its normal size. Complete compression caused no cerebral symptoms; so it was ligated with No. 1 chromic catgut at two points about 1 cm. apart.

The stomatitis promptly reappeared and lasted four weeks. The bruit did not reappear, although the size of the sac was not diminished. Just before she left the hospital the last time it still contained bright red blood, as we demonstrated by aspiration.

This patient had noticed the "lump" in her neck for about three years; but, as it had caused no pain, she had neglected it until, quite recently, it had increased in size and become painful.

Two factors evidently contributed to our seeming failure in this case; first, the pellagra, which probably prevented the formation of a clot; and, second, the general excellent condition of the arteries, which permitted the establishment of a rapid collateral circulation. As the sac failed to collapse after our second operation, we contemplated ligation of the artery on the opposite side. When compression did not seem to influence the pressure within the sac, that idea was abandoned. Then, too, the patient's dread of the return of stomatitis made her reluctant to submit to a third operation.

Following the incomplete occlusion of the vessel in my successful cases, improvement was not noted (1) by softening of the sac and (2) by clot formation (as indicated by increased firmness) which began within the first week, and there was perceptible decrease in the size of the sac within three or four weeks. Within six to eight months it was scarcely noticeable. In all cases, the post-operative treatment has consisted of absolute rest in bed for four weeks with regular moderate sized doses of morphine (hypodermatically for the first few days), the administration of such remedies as are supposed to facilitate clot formation, and a diet composed of large quantities of gelatin. However, I am inclined to believe that rest in bed is the greatest contributing factor. Very light work is advisable for six months, with the administration of moderate doses of potassium iodide. If there is a positive Wassermann, the mixed treatment should be pushed to the point of tolerance. I do not believe it wise to give any of the arsenical preparations.

The sixth and last case of this group in which we used a fascia band to constrict the lumen of the artery was that of the pulsating exophthalmos referred to my service from the ophthalmology clinic by Dr. F. P. Calhoun.

R. M., a colored man, age 20 years, was stooping over an ice box when the lid fell, striking the back of his head. He was carried at once to Grady Hospital, where he regained consciousness several hours later. There was slight internal strabismus in the right eye and blood in the spinal fluid, but no other evidence of fracture of the skull. The patient complained of a constant roaring sound in both ears. This cleared up in about a week and he was allowed to leave the hospital.

Eight months later, when he visited Dr. Calhoun's clinic, his chief complaint was bulging of the right eye and a roaring sound in his right ear. On further examination, he complained of dizziness and deafness; but the constant roaring gave him more concern than any other symptom. In addition to the exophthalmos, the whole right side of the face was enlarged and there was a lag in all the muscular movements. The tongue deviated to the left, but he could correct this when his attention was called to it. There was pulsation, a thrill and bruit over the right eye, most marked just below the supra-orbital ridge. The bruit could also be heard distinctly over the whole temporal area.

The neurological examination failed to disclose any lesion in the cranial nerves, except the deafness and a diminished sense of smell in the right side of the nose. Ophthalmoscopic examination showed only engorgement of the retinal veins and slight redness of the optic disk.

Compression of the right common carotid artery caused no cerebral symptoms, but relieved the roaring sound and stopped the pulsation, thrill, and bruit. Compression was also followed by a decrease of six beats per minute in the pulse rate (Branham's sign), a phenomenon hitherto unnoted in pulsating exophthalmos.

He was operated upon July 27, 1927, under local anesthesia.

The internal carotid artery was exposed and a band of fresh fascia lata 1 cm. wide was sutured around it tight enough to stop the pulsation, thrill, and bruit and to relieve the roaring sound. As soon as we felt sure that no cerebral symptoms would appear, the wound was closed. Within five days his hearing seemed normal and he made an uneventful recovery. Two months after the operation he was apparently well, so far as subjective symptoms were concerned. All physical signs, except the exophthalmos, had practically disappeared, including the congestion of the retinal veins and the redness of the disk.

Pulsating exophthalmos is a distressing condition, not only on account of the bulging eye ball and the almost certain ultimate loss of

sight of the affected eye, but (worse than all) the ever-present, nerve-racking roaring sound produced by the bruit, a condition which Kerr[3] says frequently leads the patient to take his own life.

Charles E. Locke,[4] of San Francisco, made an exhaustive study of the literature on the subject of pulsating exophthalmos, including his personal experience and a review of 588 reported cases treated in various ways; fractional compression of the common carotid, ligation of the common carotid, ligation of the internal carotid, compression or ligation of the ophthalmic veins, injection of gelatin, and rest. He concluded that there was but little difference in results obtained between ligation of the common carotid and the internal carotid arteries but says:

"Between 1907 and 1923 there have been more cured and improved from internal carotid than from common carotid ligation; yet, with the former there has been a slightly higher mortality. . . . Either one is comparatively safe, if there has been a previous course of carotid compression."

These conclusions, however, were reached before incomplete occlusion with fascial bands had been tried.

Harry H. Kerr,[3] of Washington, D. C., reported three cases treated by fractional ligation of the common carotid artery, the primary incomplete occlusion being done with fascial bands. Later, when the return of symptoms indicated the establishment of free collateral circulation, he completely ligated the common carotid with a double ligature of No. 1 chromic gut. After discussing the collateral circulation, he concluded that ligation of the common carotid gave the best results.

I am watching my case with a great deal of interest and hope to give final report at some future time.

For re-enforcing arterial sutures, fascial bands are ideal.

From the numerous emergencies seen in the Emory University division of Grady Hospital, I have selected fifteen injuries of the surgically accessible blood vessels. Of these, the femoral artery was wounded six times: three times in Hunter's canal from which aneurysms developed without serious damage to the distal circulation; and three times about one hand breadth below Poupart's ligament. In each of the latter not only gangrene developed but later aneurysms also developed at the site of the wound, although in one case an end to end anastomosis was done.

The subclavian was involved three times. One was treated by a proximal and distal ligation, one refused treatment, and one had an arteriovenous fistula. The profunda and brachial arteries were each involved twice. The profunda artery and vein were cut both times by a pistol ball about one inch from their origin and gave all the symptoms of an arteriovenous fistula of the femoral. In one, proximal ligation alone was done. In the second, proximal and distal ligation resulted in cure. The brachial injuries resulted in diffused aneurysms. In one, proximal and distal ligation gave a cure; in the other, we were able to restore the continuity of the artery.

The popliteal artery and vein, and the common carotid and internal jugular vein were each injured once. Both wounds resulted in an arteriovenous fistula with pulsating hematoma adjacent to the anastomosis.

One of the subclavians died from shock following the operation which had to be abandoned before completion. Symptoms returned in the profunda treated by proximal ligation alone. Three of the femorals wounded in the iliac triangle just below the origin of the profunda, resulted in gangrene which necessitated amputation about 8 inches below the injury. Later an aneurysm developed at the site of the arterial wound shortly after the amputation. The remaining cases were completely cured.

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DISCUSSION (*Abstract*)

Dr. J. Shelton Horsley, Richmond, Va.—The feature that has appealed to us, one that Dr. J. S. Horsley, Jr., has worked up experimentally, is that if we ligate a large vessel and even put on two ligatures, the lumen in many instances is restored. The conditions, however, are quite different from what they would be if a double ligature were applied and the vessel divided, for then the stump of the divided vessel would have a further source of nutrition from the adjacent tissues which does not occur in ligation in continuity. Dr. Horsley, Jr., several times found that the lumen of the large vessels in dogs would be restored after ligation. This has a very practical bearing.

The fascial ligation Dr. Campbell suggested is an excellent procedure. I happened to have two popliteal aneurysms in the hospital at the same time a few weeks ago. One patient was old, the aneurysm was large, and I thought it would be unwise to cut off the circulation immediately, so I exposed the femoral in Hunter's canal and did practically Dr. Campbell's procedure, putting a fascial band around just tight enough to occlude, and then in about two weeks I put on ligatures and divided. The patient made a satisfactory recovery. In the other case the aneurysm was smaller and I did

the regular Matas operation, with a satisfactory recovery also.

In the arteriovenous aneurysms the vessels are so infiltrated that the proper arterial sutures cannot be applied. The vein in these cases does not function as a vein, but the arterial blood pours into it and makes active back pressure. It does not have any deleterious effect to ligate the artery and the vein. In one instance I did an end-to-end anastomosis of the brachial artery and got a satisfactory result, but the actual clinical field for arterial suture is quite limited.

Dr. W. A. Selman, Atlanta, Ga.—It fell to my lot to operate upon one of these cases in the service of Dr. Campbell in the Grady Hospital. I think he deserves much credit for the conservative manner in which he handles them. In the vessels of the neck he prevents the development of hemiplegia by gradually shutting off the blood from the vein, and the element of time about this gradual compression I think means giving the collateral circulation ample time to form around this gradual block. In the case of femoral aneurysms upon which I operated, Nature had performed this gradual closure, and we had time to watch the aneurysm. There was a bullet wound of the artery, and besides the dilatation in the artery itself the vessel had ruptured and the strong fascia in Hunter's canal had limited this and had partially closed it, so the collateral circulation was well formed. We simply did a ligation of both below and evacuated the clots, with recovery. I think the fascial bands are less injurious to the blood vessels than the ligatures, and the slowing of the current gives Nature time to establish a satisfactory collateral circulation.

Dr. Campbell (closing).—I am very enthusiastic over the use of detached autogenous fascia bands. Any artery may be constricted or completely closed with them, and the beauty about it is they do not cut through. If there is any fear of the band's slipping, a cutgut ligature may be placed distal to the band but I do not believe it is at all necessary.

Dr. George Williams and I started a series of experiments along the line worked out by Dr. J. S. Horsley, Jr., but we were interrupted so many times that we finally gave it up. The arteries were ligated with heavy twisted silk low in the femoral triangle. Four weeks later one dog was killed; the vessel proximal to the site of ligation was irrigated with a saline solution and then filled with metallic mercury in order to visualized the arterial tree radiographically. At the site of ligation the plate showed a constriction of the arterial shadow and a deviation in the course of the vessel.

The artery was dissected out and examined carefully. The well tied, intact ligature had cut through the vessel walls, and was completely extruded, except for an attachment to the adventitia, where it was encapsulated in fibrous tissue. Passing a probe into the lumen of the artery, a definite stricture could be felt at the site of ligation. The result of such ligation can only be temporary. While in a series of experiments to secure partial occlusion of the vessels (conducted by Dr. C. E. Waits for Dr. E. G. Jones and reported in the Transactions of the Southern Surgical Association, Vol. 29 page 342) the vessels were constricted by bands of fascia 1 cm. wide. The fascia became incorporated with the vessel walls and the surrounding tissue so that the artery was really strengthened as well as constricted.

PRESENT DAY POSSIBILITIES OF IMMUNIZATION AGAINST INFECTIOUS DISEASES*

By FREDERIC W. SCHLUTZ, M.D.,†
Minneapolis, Minn.

The successful control of infectious diseases is without doubt one of the greatest achievements of modern medicine. It is not presumption to state that by the use of toxin-antitoxin and the universal application of immunization, it would be possible entirely to eliminate diphtheria. Immunization against scarlet fever, within the much shorter period in which it has been practiced, is by no means so successful and so certain as that against diphtheria; nevertheless, it can be accomplished in so overwhelmingly large a percentage of cases that one can regard it with assurance as protection against the disease. It promises to be perfected, alike in material and method of immunization, within a reasonable time.

There seems to be a definite analogy between diphtheria and scarlet fever, and the recent investigation of Birkhaug,[1] Tunicliff,[2] and Ferry and Fisher,[3] indicate that the principle holds good in some measure for erysipelas and possibly also for measles.

The toxin produced in each of the diseases by the causative agent will give a manifest skin reaction in the human subject. It will also stimulate the production of a specific neutralizing antitoxin in the animal and will, when injected into human subjects, immunize or stimulate in them the production of anti-bodies.

The Schick and Dick skin reactions, with their admitted shortcomings, are, nevertheless, the most valuable susceptibility tests for diphtheria and scarlet fever yet devised. These facts are attested by unbiased observation coming from competent observers in all parts of the world where this type of investigation is going on. Over a million tests made during the past thirteen years have proven beyond doubt that Schick developed an accurate test for the presence or absence of diphtheria antitoxin in the body.

Careful investigation has shown that if the blood contains enough antitoxin for immunity, there will be sufficient in the fluid in the skin to neutralize a standard test dose of toxin. The

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†Professor of Pediatrics and Chief of Department, University of Minnesota.

use of the Schick test has given much interesting and valuable information about immunity at different ages and under different conditions of environment. Park has found, for example, that on the Atlantic Seaboard over 45 per cent of adults living in the country are immune and over 85 per cent of those living in cities. These figures hold for many other parts of the United States.

An immune mother will give birth to an immune infant and this immunity may continue six or twelve months after birth. Park and Zingher[4] have shown that between the ages of one and three years, the great majority of children are shown, by the Schick test, to have no antitoxin. Year by year, as they grow older, an increasing percentage of them develop their own antitoxin and hence the percentage giving a positive Schick test declines. This change, however, is gradual. One may safely say that in the average rural community in the United States, at least two-thirds of the school children are susceptible to diphtheria and need protection and that in the cities approximately one-third of the children are similarly liable to the disease.

The accuracy and dependability of the Dick test for scarlet fever is not so surely established as is that of the Schick test. Perkins[5] gives an interesting summary of results obtained from 1924, the year of inception of the Dick test, up to the present time. His statistical material includes over 34,000 cases, covering all ages and both normal well subjects and those convalescing from the disease or in various stages of it. He concludes that the Dick test is definitely quantitative.

Changes in the amount of the skin test dose given will lead to changes in the number of negative or positive reactions. There is a group which is definitely immune. Even the maximum amount of the skin test dose will have no effect in individuals of this group. There is a smaller group which is very susceptible and reacts even to fractions of a single dose. There is an intermediate group in which a variation between one and ten skin test doses will markedly change positive or negative figures. This is the group which accounts for the variability of the statistical results of many observers. Another factor, according to Perkins, is that toxins from different sources, or even from the same source, at different times, may not be equivalent in unit value. It is clear that such factors may affect both the immediate result of an active immunization and the question of its duration. Moreover, the interpretation of the Schick and Dick test reactions is not always easy. The mechanism of the skin test is apparently very complicated.

It is generally assumed that a negative skin test indicates the presence of at least a minimum amount of antitoxin in the blood. Kellogg[6] has shown that there may be no demonstrable antitoxin in the blood of individuals giving a negative Schick test and yet the skin test may remain negative indefinitely. Kellogg's observation is not surprising in view of the fact that an antibody curve is a rapidly falling curve after immunization has ceased. It is obvious, therefore, that the skin test is not necessarily a measure of the presence of antitoxin in the blood, although, so far as diphtheria is concerned, it evidently is a measure of degree of resistance. A negative Schick test is not absolutely assurance that diphtheria infection may not occur.

The significance of the Dick test as bearing upon susceptibility to scarlet fever still seems to be a mooted matter. Numerous observers report the occurence of scarlet fever in cases which have given an unquestionably negative Dick test. The fact that it is difficult and often almost impossible to change the Dick test from a positive to a negative reaction with antitoxin, lends force to the view that the Dick test is not so closely bound up with the antitoxin content of the blood stream or tissue cells.

In discussing the relation of the Dick test to susceptibility in scarlet fever, we can not overlook the fact that the diagnosis of scarlet fever is not always an easy task. At the present time a positive laboratory diagnosis is often difficult, if not impossible. The diagnosis of any disease based upon one or two clinical findings must necessarily be subject to a large margin of error. Whatever the shortcomings of the Dick test may be, the fact remains that it is undoubtedly a most useful diagnostic measure and taken in connection with the Schultz-Charlton[7] blanching phenomenon, it offers far more than an average possibility of establishing a definite diagnosis of scarlet fever and of differentiating this disease from non-scarlatinal disease accompanied by rash. The present shortcomings of the test are due largely to the factors pointed out by Perkins.

The immunization against diphtheria with toxin-antitoxin, now so widely used in the United States, was introduced by W. Park[8] about nine years ago. The antitoxin in general use is obtained from the horse, but may also be obtained from an immunized goat. Immunization by this procedure has been tremendously successful and can be brought about in over 90 per cent of cases

inoculated. The morbidity from diphtheria has, through its use, decreased remarkably and, therefore, the mortality.

During the past three years Dr. Park has used a combination of the Schick test with the immunization method, consisting in giving simultaneously with the skin test dose also an immunizing dose. This procedure of immunization has been used in over half the school children of the City of New York. The injection is given under the skin of the forearm. It serves the purpose of immunization and at the same time shows whether the child is or is not immune. If no reaction appears by the fifth or sixth day, the child is considered immune. The case showing a reaction is given a second dose of toxin-antitoxin. This procedure obviates the necessity of an extra injection for the Schick test and at the same time gives the information the test would give.

Two objections may be raised to the otherwise excellent immunization procedure of Park. Under certain conditions, the toxin-antitoxin mixture may become unstable, thus rendering its use dangerous. In its preparation animal sera are used. This may create the possibility of sensitization to such sera should future injections become necessary.

Several years later, Glenny[9] of England and his co-workers developed a method of immunization against diphtheria in which they treated the diphtheria toxin with formalin. This causes the toxin to become non-toxic without loss of its antigenic properties. This preparation they called toxoid. Immunization with toxoid is very widely used in England and Canada, and is, apparently, successful up to the present time. Comparatively little is known of its use in the United States.

A few years ago Ramon[10] of France introduced a toxin-antitoxin preparation which he termed anatoxin. This preparation became almost immediately popular in Europe and is now widely used also in both North and South America. Anatoxin is in reality a mixture of toxin-antitoxin in which the one exactly neutralizes the other. The phenomenon of flocculation which takes place when these conditions obtain is regarded as important by Ramon, who believes that it influences the antigenic properties of the diphtheria toxin. A small amount of formalin is added to the toxin. This preparation is stable under all conditions to temperature. Very little reaction occurs after the use of anatoxin. None is seen in infants and young children. In adults and in older children, and in certain individuals who are diphtheria carriers, or are recently convalescent from diphtheria, some untoward reactions such as edema, fall of temperature, or pronounced pallor, may occur.

The favorable reports of Zoeller, Lereboullet[11] and Joannon[11] and of many others in France; of the late Dr. Zingher of New York; and of F. Bazan[12] in the Argentine indicate that this method of immunization is very excellent indeed. Theoretically, some of the objections made to toxin-antitoxin mixtures could also be raised against this preparation.

The work of Dick and Dick, of Dochez,[13] Tunicliff, Gordan, Bliss, and others, which led to the isolation of a specific streptococcus as the causative agent of scarlet fever and to the production of a demonstrable toxin by Dick and Dick and Williams has made possible a susceptibility test and an active immunization against scarlet fever by using the toxin in various dilutions and concentrations.

By the method of Dick and Dick immunity is established, in susceptible individuals, by the intra-muscular injection of a filtered toxin. On account of the nature of the naked unmodified toxin it is not possible to give large doses. Both local and general reactions are apt to be very severe. This has made it necessary to use repetitionally relatively small doses of naked toxin in order to be certain of definite and prolonged immunity. This has been one of the principal objections to immunization procedures against scarlet fever and has limited the use of the Dick toxin considerably.

Zoeller[14] has attempted to apply the method of Ramon, used in the preparation of anatoxin, to the toxin of scarlet fever, but up to the present time he has not accomplished it successfully.

A method of particular interest to us in the Northwest, is the immunization procedure developed by Larson of the Department of Bacteriology of the University of Minnesota. This consists in the detoxification of the toxins of both diphtheria and scarlet fever with the recinoleate of soda. Larson's[15] method is now extensively used in this country, as well as in some of the large clinics of Europe and South America. Netter,[16] of Paris, and his collaborators have published a very favorable report upon it. The method possesses certain advantages which highly recommend it and have gone far to establish its utility and value as a general public health measure.

In 1919, W. P. Larson, of the Department of Bacteriology of the University of Minnesota,

made the interesting observation that changes in the surface tension of culture-media and particularly in the direction of surface tension depressor changes, affect bacterial growth. In a series of papers, published since that time, it has been shown that bacteria may be divided into two main groups with respect to their behavior toward surface tension depressants. The one group, represented by the colon-typhoid organisms, grow well in media of low surface tension; while the other group, represented by the pneumococci, streptococci and the tubercle bacillus, are extremely sensitive even to a slight lowering of the surface tension of the medium. In fact, members of the latter group are rendered nonpathogenic by exposure, for short periods of time to suitable surface tension depressants.

In attempting to find the most efficient and manageable surface tension depressant for biologic work, it was found that sodium ricinoleate served this purpose better than any other agent discovered, since it is readily purified from castor oil, is very soluble and gives solutions of low viscosity, and, finally, is active in reducing the surface-tension in the pH ranges of culture media.

Having found that many pathogenic bacteria, such as pneumococci and streptococci, were rendered non-infective by treatment with sodium ricinoleate, its effect was studied upon bacterial toxins. It was found that tetanus toxin and diphtheria toxin were instantly detoxified in a solution of purified castor oil soap when mixed in proper ratios. The interesting and important observation was made that although the toxins are instantly detoxified when appropriately mixed with sodium ricinoleate solutions, their antigenic properties remained unimpaired.

Having found that experimental laboratory animals could be successfully immunized with toxins detoxified with sodium ricinoleate, Larson applied the method to the human subject with the same remarkable results.

Highly purified sodium ricinoleate, alone, causes no reaction other than a slight burning sensation at the point of injection. An injection of 0.125 L+ toxin in a two per cent soap solution, in a total volume of 1 c. c. given intramuscularly, will similarly give practically no reaction. To be clinically as well as immunologically successful, immunizations should be reduced to as few as possible. The immunizing material should, if possible, be free from antitoxin, because of the unpleasant effects, if not the actual danger of sensitization to animal sera.

Stewart,[17] of my clinic, has recently reported cases which showed that this danger is real and must be taken into account. Other observers, Park, Cayrel,[18], Baur,[19] and Lathrop,[20] report instances of sensitization produced by horse serum resulting in anaphylaxis when antitoxin is given in later life. The substitution of antitoxin prepared from goat serum, for that prepared from horse serum, in the preparation of toxin-antitoxin mixtures will not quite eliminate the danger of anaphylaxis, since it is known that sera of different animals may contain common proteins.

The use of sodium ricinoleate as the detoxifying agent eliminates the danger of sensitization to foreign substances, since it is not antigenic. This is an important point in view of the very general use now made of sera and vaccines.

The difficulty experienced in all attempts at scarlet fever immunization, from the earlier work of Gabritschewsky up to the present work of Dick and Dick, has been the necessity of immunizing with unmodified toxin. This resulted in very severe local and general reaction if larger amounts of toxin were employed, or in a necessarily large number of injections if smaller doses were used.

In order to popularize an immunization method and recommend it for prophylactic use, several conditions must be met. It is advisable, because of their high importance, to rehearse these conditions. The number of treatments required to effect immunity must be brought down to a minimum. The injection should be followed by little or no reaction. The immunization period should, if possible, be shortened to bring it within the incubation time of an infection. If these requirements could all be met, a procedure would be at once available which would permit the suppression of an existing epidemic and, at the same time, provide the possibility of permanent immunity.

By using scarlet fever toxin detoxified with sodium ricinoleate, many of the conditions for an ideal immunization are met. The toxin has been modified without altering its antigenic properties, so that a large dose of the toxin may be given without producing toxic effects. The detoxifying agent is not antigenic. There is, on that account, no danger of sensitizing the patient to foreign sera. The so-called scarlet fever antitoxin will not serve as a detoxifying agent for purposes of immunization, since the "neutral" mixture is not always stable. The "neutral" soap toxin mixtures are really stable and, so far as can be determined, remain so indefinitely, if properly prepared and stored.

The importance of using such a detoxifying agent as sodium ricinoleate, which reacts with all toxins, is apparent in view of recent work of Park and Spiegel[21] who have shown that scarlet fever toxin is not a distinct entity as are diphtheritic and tetanic toxins, but that a given strain of scarlet fever streptococcus may secrete four or more toxins which show antigenic differences. The sodium ricinoleate method enables one to detoxify all streptococcic toxins, irrespective of groups, to the point at which large immunizing doses may be given without causing objectionable local or general reactions.

Intramuscular injections of from 3000 to 10,000 skin-test doses are followed by little or no reaction. Children over twelve years of age and adults seem to be slightly more sensitive to the toxins than younger persons. In all the experimental and clinical work carried out by Larson and my associates, the scarlet fever soap toxin was prepared in such a manner that the desired amount of toxin was contained in a volume of 1 c. c. In most of the clinical work, 3000 skin-test doses were used. It was found that this amount of toxin gave a high percentage of immunity in a relatively short time, as determined by the skin test.

The acquisition of immunity varies, within certain limits, directly with the size of the dose of toxin, although not all age groups respond to a toxin in the same degree. The larger amounts of toxin, from 3,000 to 4,000 skin-test doses, give an apparent immunity in from 77.3 to 90 per cent of the cases within eight days following the injection. As regards duration of the immunity, it was found that 70 per cent of those who gave a negative skin-test within eight days following the injection of even small doses of scarlet fever soap toxin were still negative after six months.

The nature of the causative agent of scarlet fever has led to the conclusion that a polyvalent antigen is highly necessary, and that it is desirable that the antigen should contain not only scarlet fever toxin but the streptococci as well, to develop an anti-bacterial as well as an antitoxic immunity. Such an immunity would provide a double security against scarlet fever. This combined procedure is possible with the use of the sodium ricinoleate as a detoxifying agent and is the form in which the scarlet fever immunization is now carried out in my clinic.

On account of the general effect of sodium ricinoleate upon most of the toxins, the question arose whether it would be possible to combine various toxins in a single procedure of immunization. It is obvious that it would be of great advantage in an immunization campaign if one could immunize against two or more diseases at one and the same time. It is not easy to persuade individuals, and especially children or their parents, in their behalf, to submit to such a series of vaccinations as are now necessary if one wishes to be immunized consecutively against diphtheria and scarlet fever.

An attempt was therefore made to immunize with the combined toxins of diphtheria and scarlet fever after the detoxification of both with ricinoleate of soda. It was found that this was entirely possible. The toxins are combined with sodium ricinoleate in such a manner that 3000 skin-test doses of the scarlet fever toxin are combined with 0.1 L+ dose of diphtheria toxin. This mixture, upon inoculation therewith, will cause no untoward symptoms excepting, possibly, a slight local reaction.

These combined soap toxins contain one thousand million scarlet fever streptococci and their toxins, together with O.1 L+ dose of diphtheria toxin in every cubic centimeter. Generally three injections, of 1 c. c. each, are given at weekly intervals. Children injected with this immunizing material will, in a large percentage of cases, become negative to the toxin alike of diphtheria and scarlet fever. The apparent efficacy of this combined immunization procedure is illustrated in the following experiences:

In a recent study, 13,005 school children of Minneapolis, and 524 in a neighboring village, were immunized by the method described above. There is a school population of about 105,000 children in Minneapolis, thus leaving about 92,000 children unimmunized. In this non-immunized group, 2,187 cases of scarlet fever have developed during the past year, or one case in every 42 children. In the immunized group of 13,005, only 25 cases of scarlet fever have developed, or one case in 520. Only two cases of diphtheria have developed in the immunized group, or one in 6,500 cases, while 658 cases have occurred in the non-immunized group, or one case in 138. No severe local or general reaction was noted in a single case.

In the smaller series of 524 village cases, 90.6 per cent were Dick negative after a period of three months. To our knowledge, not a single case of diphtheria or scarlet fever has developed in this group up to the present time.

Eder,[22] of my clinic, and McBroom,[23] of the State Institutions for Dependents, report some interesting institutional experiences with the use of the combined vaccines. In an institution of

250 beds, where it has been a routine practice to inoculate all newly admitted cases with three injections of the combined soap toxins, no case of diphtheria has developed during the past year. Prior to this period, within which this immunization practice has obtained, as many as 40 cases were constantly in quarantine.

McBroom's report covers 2,000 immunizations of inmates of several State Institutions, housing both children and adults. In one series of 421 cases (251 males and 170 females) to all those under twenty years of age, a single dose of Larson's sodium ricinoleate vaccine, containing 3,000 skin-test doses of scarlet toxin and O.1 L+ dose of diphtheria toxin was given, with the object of determining the length of immunity acquired with one such injection. All of them were Dick tested before injection. Eighty-four showed a positive reaction. Of these eighty-four, sixty-six became Dick negative after the immunization and remained absolutely negative at the end of eighteen months. This series seems to show that even a single immunizing dose affords a considerable measure of protection.

In another still larger series of 1931 cases (955 males and 976 females) ranging in age from six months to seventy-five years, a total of 5,975 doses was given. Sixty-six per cent of these cases gave no reaction, 34 per cent a slight or moderate reaction to immunization. Only two cases gave a general or systemic reaction. This series showed that diphtheria and scarlet fever vaccines, given in combination and at one and the same injection, do not produce any greater reaction than when either one is used alone. If a reaction does occur, it is so mild that it is of no consequence. This confirms the experience recorded in the University pediatric clinic, where over 40,000 doses of the combined soap toxins have been given without a single severe reaction.

In the institutions where McBroom carried out these tests, not a single case of scarlet fever or diphtheria has appeared during the last nine months since complete immunization of all the inmates as a routine procedure has been carried out. This is a remarkable experience in view of the fact that scarlet fever has always been a very common disease and diphtheria has been endemic or epidemic in these institutions for the past thirty years.

Results and experiences like these would seem to indicate that immunization with these combined vaccines is not only possible, but also very effective. It is needless to point out the tremendous importance and practicability, as a public health measure, of this procedure, particularly, if it shall still further be supported by such evidences.

Other investigators, particularly Glenny[24] and Zoeller[25] have attempted the use of combined vaccines, but up to the present time have not succeeded; apparently on account of technical difficulties and the inability so to combine the toxins that they continue to be effective and, at the same time, non-toxic. Larson has accomplished this, in a most satisfactory manner, by the use of sodium ricinoleate as a detoxifying agent. The toxins of diphtheria and scarlet fever can be combined without producing dangerous toxic reactions. They can be given in large dosage with complete safety and apparently with considerable assurance of immunity. These mixtures of the toxins have the added advantage of freedom from animal sera and of stability under ordinary conditions of temperature.

Experimental work now in progress seems to indicate that Larson's detoxification procedure is applicable to many other forms of toxins besides those of scarlet fever and diphtheria. Carmichael[26] has found, for example, that it detoxifies snake venom.

In my clinic we are convinced of its excellence. It seems to have decided advantages over other types of immunization procedures and apparently promises to have a wide field of application and usefulness.

From the few details I have sketched and from the most superficial study of facts and statistics in the field of immunization against contagious disease, it must be clear to everyone that very great progress has been made and that the possibilities for the future are as great or greater than in many other fields of medicine.

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BIG BOOKS AND MUCH TEACHING*

By STEWART R. ROBERTS, M.D.,
Atlanta, Ga.

That section of my mind devoted to medical teaching and medical school experience has long been under three distinct impressions. (1) We are attempting to teach the medical student too much. (2) The academic mortality among freshmen students is too high. (3) The text books for the students are too big. Following the urge of these impressions, letters were sent to eighty-one deans of medical schools in the United States asking the following questions:

(1) The estimated number of books and the total pages recommended for freshmen, sophomores, juniors and seniors.

(2) What percentage of your freshmen drop out for one cause or another?

(3) What percentage of your sophomores drop out for one cause or another?

We received 41 replies, about 50 per cent.

The human mind can take in just so many details. Given multiple details and a few great principles, the principles are too often obscured in the mass of details. The much teaching of multiple details has apparently reached such a degree that details are crowding out conclusions and mere series of facts, many of them relatively unimportant, are obliterating principles. Medical education, like life itself, is a flux with varying accents. In many schools the standing of the students is based entirely on his examination. Everywhere the accent is on credits or class standing or examination. Research and contributions from chemistry, bacteriology, pathology, pharmacology and physiology have in the last fifty years so upheaved clinical medicine that there is a sharp distinction of matter, method and form between the last two clinical years and the first two fundamental years. Until very recently and in some schools not at all, there is no clinical teaching in the first two years. The teachers in the first half of the medical course are men who are scholastic specialists in a particular narrow field of knowledge, as embryology or gross anatomy, often not even graduates in medicine, whose mental constitution has lead them away from practice and the art of medicine. Think of a professor of pharmacology without the degree of Doctor of Medicine or any clinical experience in the art. With the possible exception of teachers of pathology, as a rule, these men are not even in touch with the ways and problems of clinical medicine. It is as if a school of theology was manned by teachers who are not preachers, or who had never preached and cared little for the church or the duties of pastor or priest. Naturally, the average tendency of such teachers however scholarly or gifted, is to accent the subject for which they are responsible without relating the science to the broader field of medicine. Furthermore, in the present state of the crowded curriculum with the overwhelming mass of fact and detail accumulated in the big books of today, they have not time even if they were capable. The student feels that "it was after the first semester, or near the close of my first year, before I knew what it was all about." Yet in the hands of the teachers of the first year rests largely the passing or failure of the students, and the teachers of anatomy, gross and microscopical, embryology and chemistry, determine those who shall practice medicine by determining those who shall ascend to the second year. In certain schools examinations are given in six or eight weeks after the year begins and a large per cent of failures recorded. It would seem that the first duty of teaching in the first year is to let the student know what it is all about, give him time to grasp his subject, be patient with his development and at least record against him no failures until the first half year has passed.

Certain tendencies are therefore apparent. The teacher tends to over-accent his subject and teach too much. Detail is substituted for perspective and memory for wisdom. The personal relation and development of the student is largely eliminated. Even whole time teachers often do not know the name of their students. "I will ask you that," he says, nodding to a certain student.

A failure in embryology, even though the student has worked hard, may be based entirely on the examination and not on the work or effort

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expended by the student. A man may fail in embryology under certain pedagogical standards and yet have in him the making of a great physician. Embryology is more difficult than histology in a ratio of probably ten to one, and the value of the two subjects to the student is probably in the reverse ratio, yet, they are both of equal credit and equal standing in the curriculum.

The curriculum is a jumble of successive subjects and hours running with military precision often from eight to five, the teacher often wanting more time and the student confused by the persistent bustle and hurry. There are so many professors, that few of them know the students who rush from histology to gross anatomy to chemistry, or from therapeutics to syphilis to medicine, from optics to dermatology. The personal element is eliminated and no true education ever can eliminate the personal. Only one student in eight does any cultural reading during the five years of medicine and internship. We are training a cultureless profession except for microns and facts. The practice of medicine, the art of medicine, the relief of suffering, the pride of clinical labor, is discounted in favor of research and mere memory, knowledge, statistics and marks.

James MacKenzie relates that during his medical course at Edinburgh one of his teachers sent for him and told him he was a dunce. The boy had a great mind with great reasoning powers and a relatively poor memory. In the present day medical school in America he would probably meet an academic mortality by the close of the first semester. I have known professors in the first year of a medical school to send for a student and tell him to withdraw without further evidence than the professor's impromptu opinion and restricted experience with the student in his own narrow subject, taught from the viewpoint of his specialty. The professors in a medical school represent group medicine accenting pedagogy. There is more to a medical student's mind than memory, but memory is the only function that permits passage from class to class in the average school.

The tendency to present day instruction can well be illustrated by three scenes. (1) A sophomore medical class, just passed the freshman anatomy with approximately 30 per cent failures, was asked for the gross anatomy of the thyroid gland. Not a man in the class could give it. Their explanation was: they were so afraid they would not pass and had devoted so much time to the description of the bones, the smaller muscles and relations of the different vessels that they had very little time for the viscera and had forgotten much of their course throughout the summer. (2) A squad of eight seniors was asked the function of the kidney. None of them could answer it but instead gave promptly the theories as to the secretion of urine. They had a splendid course in physiology, but it was given with the accent on pure physiology rather than physiology applied to clinical medicine. (3) An intern took a former professor and staff member of the hospital to see a heart case. The chest was exposed and plainly in view was the thrusting apex beat in the sixth space to the left. The intern was asked: "Where is the apex beat?" His reply was, "A teleo of the heart has been taken, but the roentgenologist has not made his report. If agreeable, I will run to the x-ray laboratory and get it and bring to you."

The Commission on Medical Education summarized the criticism of many practitioners of their medical education as follows:

(1) There is overcrowding in the schedule of work throughout the medical course.

(2) Much of the teaching in the science courses in both laboratory and theoretical work does not contribute to a sufficient understanding of these basic sciences on which intelligent practice or other medical work depends.

(3) Too much of the clinical teaching is from the standpoint of the specialist and on rare diseases and not enough from the standpoint of the needs of most patients.

(4) The divided responsibility for the care of patients and the impersonal attitude frequently taken toward patients in the hospital and clinic, handicap the preparation of students for the assumption of the individual responsibility required in practice, and for the large emotional and psychological factors seen in many illnesses.

The trouble begins further back in the premedical student's life. To quote Barker of Northwestern,

"The majority of instructors have little or no knowledge of medical education; they take no particular interest in the premedical student, his special needs and natural interests. Such an instructor fails to place emphasis on the most important parts of his subject and in his teaching does not take advantage of the natural interests of the premedical student. Too many instructors fail to recognize that any course may be a happy combination of discipline and practicality."

It is natural that the tendency to insert courses introductory to clinical medicine in the sophomore year should increase and that Zapffe's suggested new curriculum should include clinical instruction beginning in the first year. The present curriculum seems based on the idea that

given a student thoroughly grounded in the pure sciences of the first two years, proved by passing his examinations he will make an efficient clinician. The question arises, does present-day teaching train the student directly for his profession or does it primarily train him rather for a University degree? How much after graduation does he unlearn and forget and replace by the clinical epigrams of experience?

BIG BOOKS

The first edition of Gray's "Anatomy" published about 1860, is the beginning of big books, as textbooks. Big books represent an easier task for the author. Restricted to a smaller book, he must condense, simplify, conclude; in the large book, he can amplify, enlarge, reiterate. Big books mean a larger turnover to the publisher, a larger expense to the student and a larger profit both to author and publisher. Big books academically mean big profits commercially. The books recommended, the books used, and the amount of reading done by the student varies in the different schools and is rather difficult to ascertain accurately. As a rule the average school recommends and the student uses from twenty to thirty-five books, averaging 1000 pages per volume and totalling 20 to 35,000 pages. The custom of one school may be directly opposite that of another as regards text-books and reference work. For example, one school has no specific page assignments during the four years except in histology, minor surgery and half of obstetrics. General reading and reference is the rule, and to pass many courses in this school no reading is necessary, in the opinion of a senior student. And yet thirty-six books are required, with a total of 24,673 pages. One dean believes, "the bigger the book, the better if the material contained is correct and properly presented." Another wishes the student "freedom to browse in the literature" and believes that set lessons is "spoon feeding." One dean says "big books and a limited time allotted to the subject of the big book, are the real problems of the medical school." Think of Gray's "Anatomy" in six months or McCallum or Kolmer in the time allotted to pathology or immunology. Here is a typical list for the first two years:

Gray's Anatomy
Ranson's Neuro-Anatomy
Jordan's Bacteriology
Beattie and Dickson's Pathology
Howell's Physiology
Norris & Landis' Physical Diagnosis
Wharton's Minor Surgery
Rosenau's Hygiene
Addison's Histology
Arey's Embryology
Kolmer's Immunology
Hawk's Physiological Chemistry
Cushney's Pharmacology

One dean, commenting on such a list, adds, "This is a terrifying list if the student really took it seriously. The teachers are forced practically to dictate the lectures, if they are disposed to be merciful." Another school in four years uses thirty books, of 17,768 pages. Another dean believes that "a good grounding in a first class text-book enables the student to meet this condition better than to try to have him do too extensive reading, which may lead to confusion by the multiplicity of often conflicting opinion." One school uses forty-four books, of 34,700 pages. One school uses twelve books in the second year alone. Another dean writes "the work is done by clinics and lectures and the question of reading up on the subject is left to the student to a considerable degree."

Since the time of Gray the flood of research has so increased the facts available in any subject that today the average text-book is rather a reference work for a specialist than a text-book for a student. Books are getting thicker and more numerous. It would seem that teachers are tending to recommend more books and thicker books rather than fewer books and thinner ones. One dean believes that "only a certain physiology was small enough to be suitable for a text." In the twenty-five years that has elapsed since I studied embryology the text has doubled, tripled or quadrupled, depending on the current text selected. The text-books are not written for the schedule but rather for the specialist. For example, one embryology, of 420 pages, which I use in my library as a reference work, large, expensive and so thorough as to include the triple embryology of chick, pig and man, often all three in one paragraph, is used as a text-book of embryology for first year students in one medical school. The mortality in this course was 35 per cent. One page of this text was more difficult than 50 pages of a novel. It was written by a scholar and a specialist in embryology for other scholars and specialists in embryology and the author evidently had in his mind no thought of student or schedule. The illustrations can be multiplied.

The question arises, would not a few pages, simply, carefully and succinctly prepared, juicily presented, if such an adverb may be used, be of more lasting value, plus the comments and

questions of the teacher, than a jumbled mass of words, details, valuable points and principles, skimmed over *en masse*? Even the mind of a medical student has limitations of digestion, absorption and assimilation.

Between 1911 and 1925 inclusive, 64,291 medical students were enrolled and 47,241, or 73.5 per cent, graduated. Of the 17,959 who did not graduate 8,973, or 52.6 per cent, dropped out at the end of the first year and 3,884, or 32.8 per cent, dropped out at the end of the second year; or 85 per cent of the medical students who dropped out did so during the first two years.

Basing conclusions on the 41 replies we received, the average freshman mortality is 10 per cent, ranging from a low 2 per cent at Rush and the Johns Hopkins; 5 per cent at Cornell, Leland Stanford and North Carolina; 22 per cent at Baylor; up to 30 per cent at Tulane and Emory. The average mortality for sophomores is apparently 2 per cent. Many of the larger schools have no sophomore mortality except for illness and the smaller schools with less financial resources tend to a 5 per cent mortality. Why this variation in freshman mortality? What are the conditions that prevail that credit South Carolina with only 10 per cent and Tulane with 30 per cent. Who standardizes the standards? Tulane seems to afford its freshmen ample leisure for study whereas the Emory freshman schedule seems full and yet both have the same mortality. Is the mortality the fault of the student or the professor or both? Subjects differ in difficulty and professors differ in their ability to present the subject, in their ability to put themselves in the student's place, and in an over estimate on the value of their subjects. Library and reference work may be overdone and the student non-plussed and discouraged. A syllabus systematizes and circumscribes the essential facts in any course.

Does the average medical school give sufficient attention to a reduction of the mortality among the freshmen students? What reason is there for such variation in mortality among schools in the same section of the country and of relatively the same standing? Does not the fault lie primarily at the door of the professor and the school? But there is another side to the matter. The physicians are escaping the country and flooding the cities. With poor pay, no hospitals, much exposure and hard work, the country certainly offers less attraction than the city. The average age of the country doctor is sixty-five years and the city doctor, forty-nine years. The Bulletin of the American Medical Association has recently stated that

"From the statistics on file in this department, it would seem that the problem of medical service in the country town is one that must receive more serious attention from the legislature and the medical profession."

In ten more years, at the present rate, throughout the country there will be large areas without sufficient medical attention. What then, will the American people do? What then, will the average legislature of the average state do? Certainly the people want well trained physicians but they want practically trained physicians for practical sick people. They are not interested in big books, or details, or credits but they are interested in enough doctors. New Hampshire has 116 towns without a physician and 30 per cent of the towns of Connecticut have no physicians. Only 2.5 per cent of the Hopkins men have settled in towns of 2500 or less. Of towns under 1000 in Connecticut 80 per cent are without physicians. It is comparatively rare to find a senior medical student whose intention is to settle in his small town and I never find one who intends to settle in the country. Many counties in Georgia have not had a new physician in from 5 to 15 years. One county of 14,000 people has two able bodied doctors and one half sick doctor; another, one well doctor and two half-well doctors for 20,000 people. Moore's "American Medicine and the People's Health" is worth the reading of every physician.

The following problems present themselves:

(1) There is a feeling that the average medical school is attempting to teach too much, in too hurried a curriculum, in too theoretical a manner.

(2) The failures in the Freshman year vary widely in the different schools.

(3) Should not freshmen receive more personal attention from the faculty and excessive mortality in a department be investigated?

(4) What plan can be evolved whereby the teachers of the first year and second year may relate their subjects more to clinical medicine?

(5) Would smaller books and more selected teaching reduce the freshman mortality and increase the number of physicians?

(6) Good roads and the automobile have made three country doctors out of one, otherwise the clinical crisis of the rural districts would already have been at hand.

(7) Can a plan be evolved by community bonus or new hospitals in rural districts where-

by a recent graduate will obligate himself to practice for five years in a given community?

(8) The present-day product of the medical school is so finished, so scientific, so steam heated to diagnostic aids and therapeutic conveniences, that domiciliary medicine, apart from urban areas, is a snare and a delusion. The demand for new and younger physicians in the rural districts is increasing. Can the medical school answer the demand or must the State force the medical school to answer the demand, or in the present evolution of medicine will the State take over medicine as it has taken over education?

DISCUSSION (*Abstract*)

Dr. Leonard Murray, Toronto, Ont.—The worst feature of modern practice is the increasing lack of personal touch between patient and physician. This can only be of the greatest detriment to both.

Those of us who have been in practice over a period of years, know very well what it was to drive through snow and sleet in an open carriage, but we also remember the delight which came with being considered the family friend and physician.

If one visits the clinical laboratory of a modern hospital he sees a mass of apparatus for the elucidation of all sorts of chemical problems, but has great difficulty in finding any facilities for examining urine for albumen and sugar. Such simple examinations will continue to be the common practice of the best of our modern graduates and if done with care will place them above the average practitioner. What the highly trained specialist may do further is another matter. He enters into comparatively few cases and knows little of the contact which was beneficial to physician and patient.

Dr. Robert Wilson, Charleston, S. C.—I do not believe that the high freshman mortality is altogether the fault of the school or of the size of the text books. It depends to a considerable extent upon the premedical education which the student has had. With a minimum requirement of two college years with the course of study strictly standardized, it seems to me that we are not laying a broad enough educational foundation to develop the mental faculties in the way they should be developed.

The comparison was made between the low mortality of the Johns Hopkins and the high mortality of Tulane. I cannot help thinking that the important cause of this is the better mental training which is required at the Hopkins, as an academic degree is a prerequisite to matriculation. In our own school I have made an analysis of this situation and have reached the very definite impression that the young men who are admitted into the freshman class with only two years of premedical training are more apt to fail than those who have spent a longer time in college and acquired a broader education. In the last few years we have had an increased number of students who have had at least three or four years of college preparation. Only a very small percentage has had only the two year minimum requirement.

Another reason of freshman mortality is that young men come into contact with new lines of thought and study and a little while is required to readjust themselves to the situation. Those students who have spent a longer time in college and have had a more thorough and comprehensive educational training are better able to adjust themselves.

With regard to the teaching in the later years, I am not so much concerned with the weight of the books as with the weight of the teacher. Much more depends upon the bigness of the teacher than upon the books he uses. The character of the teaching is determined by the limitations of the teacher, rather than by the text-books or reference books that the student may use. It seems to me that it is less important to direct our attention to teaching facts, which students can get for themselves, than to the teaching of method of work and thought. They should learn how to obtain the necessary data from the patient and how to analyze and synthetize. In other words we should teach him to use his mind as an instrument for constructive thinking. If I have succeeded in teaching my students proper method in their examinations and how to handle the information which they obtain, I feel that I have succeeded in my efforts.

Dr. Isaac J. Jones, Little Rock, Ark.—I am one of the survivors of a species which will soon be as extinct as the dodo. I am a survivor of the two year medical course. I am now teaching a branch in medicine that was not even taught when I was a medical student, bacteriology. It was an unknown science at that time. Whatever success I have had in the pursuit of medical science has been not on account of the text-books which I studied in school, but from the inspiration that I got from my teachers. That is the greatest thing that a student can get, but he cannot get it if we keep him constantly befogged in a mass of facts and details.

As to the remedy for the situation in the country districts, I am in hearty sympathy with the country people in their dilemma and I want to say this: it may affect some of you and some of you it may not, but the appropriation from the state legislature is very important. My school is supported by a direct appropriation from the state legislature. Without that appropriation we could not exist, and if we do not soon find some method of putting physicians in the country districts we shall soon cease to exist.

Dr. W. R. Houston, Augusta, Ga.—It is not undesirable to eliminate a certain percentage of the students in the freshman year in order to get the best ones. The statistical situation is that 1500 students in the past year were unable to obtain admission to the medical schools. Now if we are by chance taking in a considerable number who could be worthily replaced by some from among that group of 1500 that cannot get in at all, it might be just as well to eliminate some of the matriculates. It is not easy to propose a test that will find the best students, but such methods as we have should look to the elimination of the less fit and the retention of the more fit.

The size of the books has undergone, in my recollection, quite a change. There was a time, not so very

many years ago, when we had small books. Most of the students had a series of little books when preparing for examination. They were not written by men of distinction. I do not recall the names of any of the authors. The better students of that day looked down on one who used the little books and the more ambitious students aspired to have the big books. So true was this that I was surprised to find, when I went to study in Germany, that the good students still used small books. For instance, every one had sticking in his side pocket Klemperer's "Physical Diagnosis" and they learned that by heart, for there was scarcely anything in it that could be left out. It would be a splendid thing if men of the highest ability would address themselves to the task of making small books. However, a man is very timid about that for fear he will leave out something important.

Dr. C. C. Bass, New Orleans, La.—I must say something in defense of Tulane and Emory. Although the books may be large and the list of them may be large the student is not expected to learn all that is contained in them. Many of them are used for reference books and what we are trying most to teach the student is how to use these and other books. As a matter of fact, none of us remembers all of what we learned even in the smallest books we studied.

With reference to the high mortality in the different schools, Dr. Wilson has very clearly indicated one of the chief reasons. For various reasons there is the greatest difference in the preparation of students who are admitted to the different schools. There are a number of schools whose circumstances, financial and otherwise, make it possible for them to select a group of highly trained students. Naturally, students so well trained scientifically and usually culturally also are more successful in the study of medicine, as they would be also in any other course, than less well trained students, of which other schools may have to take a larger proportion.

There is also a certain considerable mortality resulting from misplaced students. Many students start in the medical course, but soon discover that there is too much work in it, or for another reason they wisely decide to drop out. A good bit of the mortality in Tulane, and in other schools, is due to students who get out because they find themselves "in the wrong pew." While I admit that 30 per cent mortality sounds too high, I would explain further that the session 1926-27, which Dr. Roberts chose for his inquiry, happens to show a higher rate than the average. There are a number of factors which serve to explain the condition and I do not think we should feel too much alarm, for we are at the same time getting rid of many unfit in the first year, which results in a saving to them and to ourselves.

Dr. E. Bates Block, Atlanta, Ga.—During my first two years in teaching neurology in Emory University, the mortality was 32 per cent one year and 33 per cent the other. Obviously there was something wrong with the teacher or with the students. Frankly I suspected the teacher. In the solution of the problem I published notes which I revised each year and furnished the students, which formed a very brief syllabus. I read over 6000 pages on hysteria, for example, and boiled it down to three pages of notes. I admit that the English is sometimes not good but it is done for the sake of brevity, so that every word counts. I reduced the mortality to 7 or 8 per cent. One reason for the lower mortality being that I now have better students.

I have two methods: one is to require as a routine the learning of this syllabus which gives only the important diseases and then under the head of diagnosis gives more briefly the diseases from which that particular disease must be differentiated. That is what is required in the third year. When the students take up their clinical work in the fourth year I require them to sit down beside the patient with a large book to read about the disease which they think the patient has, to write down every symptom that he has and every symptom that he has not. By this I mean both symptoms and signs. When we get the diagnosis they read over each of the diseases from which that case must be differentiated.

In my mind, there is a place both for the large and the small book. For routine work unquestionably a syllabus is far superior but for bedside knowledge and for the writing up of the case the student should have a large book. The difficulty about the small book is that it must necessarily be more or less dogmatic. For example, last week I lectured on the olfactory nerve. The notes occupied only three or four lines but I consumed forty-five minutes in the lecture so that I had ample time to qualify my statements and discuss the various essentials in the lecture. However, the essential things were printed in the notes in three or four lines.

Dr. Roberts (closing).—Preventive medicine has been unquestionably a factor in reducing sickness in the country districts. However, it is not so much a factor in reducing sickness in the country district as in the urban area. Another factor that might be mentioned to explain the scarcity of physicians in the country, is the lack of obligation that the average country resident feels financially toward his physician. You cannot expect a man with a family to remain indefinitely in an area where his patients do not afford him a reasonable income. Self defense and self protection is the first law of nature. The burden is to a degree on the residents of the country district.

Dr. Bass I am sure knows that my remarks were intended no more as a criticism of Tulane than a compliment to the Hopkins. This was simply an effort to get at the facts of the case. McGill last year admitted 120 students and turned away 480, which means that where the great financial resources are in the schools there the great teachers go, and where the great teachers go there the best prepared students go. After all, the character of the preparation of the student in the freshman year is in a sense the measure of the financial resources of the school and the greatness of his teacher. It takes money for medical education and we need not discuss it unless we have money. The legislatures in the South are important considerations. Two years ago a bill was introduced to lower the standards of the medical schools in one state in order that the country districts might have physicians. We must remember the average mentality of the average legislature of the average Southern state, and general average is the greatest of all the generals.

ACQUISITION OF SPECIFIC HYPERSENSITIVENESS*

BASED ON THE STUDY OF ONE THOUSAND ASTHMA AND HAY-FEVER CASES

By RAY M. BALYEAT, M.A., M.D.,
Oklahoma City, Okla.

Almost every aspect of the subject of human hypersensitiveness offers questions which up to the present have been unanswered. One of the first that naturally presents itself concerns the factors that influence the acquisition of the hypersensitiveness, a question that certainly calls for more study.

The material for this study is based on 1,000 cases of atopy (bronchial asthma and hay-fever), 119 newborn babies, and 403 normal University students. The asthma and hay-fever patients were all American born, private cases, whose ages ranged from five months to eighty-six years and who had been under observation from six months to five years. The babies were the newborn from one of our private and one of our charity hospitals. The students were from the University of Oklahoma. In our study we shall consider only those points which pertain to the acquisition of specific sensitivity.

In this discussion the term "atopen" and "protein" will be used to some extent interchangeably. "Atopen" is a term suggested by Coca and Cooke[1] to designate the substance to which patients become specifically sensitive. The term "atopy" will be used, and was also suggested by the same authors to designate inherited human hypersensitiveness.

It has not been definitely proved that the substance to which patients become specifically sensitive is always protein. In fact, Grove and Coca[2] have shown experimentally that the pollen atopen is a non-dialyzable, non-digestible substance and is probably non-nitrogenous. However, in an undigested pollen solution the atopen content is usually in direct proportion to the nitrogenous content. For this reason nitrogen determinations of the solutions are made to evaluate the relative atopic activity of the extracts. Black and Moore[3] in a study of the chemistry of pollens digested the pollen to the extent that the amount of protein left in the pollen solution would not give a reaction to the biuret test, yet there was no appreciable lessening of the atopic activity of the extracts.

The physiological chemists tell us that the proteins before they are absorbed by the intestinal tract into the blood stream are hydrolized to amino acids and are absorbed as such and circulate in the blood stream in that form. Prof. Howard B. Lewis[4] of the University of Michigan believes that protein is not absorbed through the intestinal tract in any other way than the one just mentioned. However, Dr. Edward B. Meigs[5] of the United States Department of Agriculture, Bureau of Dairying, states:

> "In regard to the general question of the passage of complete proteins or large fragments of the protein molecule through the intestinal wall and through the cells of the mammary gland, I think it may be regarded as established. There is good reason to believe, however, that this passage of complete protein through the mammary gland cells and therefore through the intestinal cells of the offspring, is reduced to nothing or almost nothing after the first few days of lactation."

Shannon[6] has shown that the proteins of human food pass into the human milk in large quantities in the early state of lactation. Black[7] relates a history of a child under his care, who was sensitive to peanuts, who had two attacks of asthma directly traceable to using milk from a cow fed on peanut hay, which is excellent evidence that either protein, or a substance, nitrogenous or otherwise, passed into the lacteals. Waltzer[8] demonstrated that unaltered protein of at least part of the egg to which the patient is sensitive could be frequently passed unchanged into the blood stream. If it can pass through the intestinal mucosa unchanged, the author sees no objection to believing that it can pass into the lacteals.

The author has observed clinically that the atopic substance in food, whether it be protein or non-protein in character, probably is absorbed by the mucous membranes of the mouth and stomach, as symptoms of a specific sensitivity will frequently appear from two to ten minutes after the patient eats a protein to which he is specifically sensitive, which is not sufficient time for digestion of proteins to take place.

Considering our observation of the clinical manifestations of atopy in the light of the present knowledge of the chemistry of digestion and the normal constituents of human and cow's milk, the writer is of the opinion that the substance to which patients become specifically sensitive is in most cases a non-nitrogenous one, probably enzyme in character.

In studying the factors that influence the acquisition of human hypersensitiveness, the part

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played by inheritance should first be considered. The asthma and hay-fever cases used in studying this factor were made up of 28 seasonal hay-fever cases and 152 cases of asthma under fourteen years of age, 63 perennial hay-fever cases, 382 seasonal hay-fever cases, and 375 cases of asthma over fourteen years of age. They were all individuals who gave unquestionable histories of asthma or hay-fever and on whom specific cutaneous reactions could be exhibited either by dermal or intradermal tests. From these patients careful histories were obtained concerning the presence or absence of hay-fever and asthma in their antecedents. Most of the cases were above the average in intelligence, which gave us an opportunity to elicit moderately accurate data.

In 541, or 54.1 per cent, the antecedent history was unilaterally positive, that is, positive on either the maternal or the paternal side. There was a positive bilateral history, that is, on both paternal and maternal sides, in 60 cases, or 6 per cent. Therefore, of the 1,000 clinical cases of hay-fever and asthma 601, or 60.1 per cent, gave positive antecedent history. It is true that many patients do not know of a positive history of hay-fever or asthma in their parents when it actually exists. Hence the percentage of positive family histories is much greater than the figure given. The antecedent history was negative in only 399, or 39.9 per cent. Spain and Cooke[9] found a positive antecedent history in 58.4 per cent of a series of 462 cases of bronchial asthma and hay-fever they studied.

PER CENT OF POSITIVE ANTECEDENT HISTORY IN THE NORMAL

Since the presence of a positive antecedent history in the asthma and hay-fever cases reported is rather high, it seems important to compare this percentage with the presence of a positive family history in normal individuals without a clinical history of asthma or hay-fever. The cases studied for this purpose were 403 normal University students. A positive family history of asthma or hay-fever in relatives of the first degree was elicited in 37 cases, or 9.1 per cent. Spain and Cooke[9] report a series of 115 normal individuals with such a history in 7 per cent.

AGE OF ONSET OF CLINICAL MANIFESTATION OF HYPERSENSITIVENESS

In 23, or 37.3 per cent, of the asthma and hay-fever cases with a bilateral family history the onset of clinical manifestation occurs in the first five years of life, and in 13, or 21.3 per cent, the onset of symptoms occurs in the second five years. Hence a total of 58.6 per cent of the cases with a bilateral family history will manifest clinical symptoms of specific hypersensitiveness in the first decade of life. There were 175, or 32.3 per cent, of the cases with a unilateral history that manifested clinical symptoms within the first ten years of life. In only three cases with a bilateral family history was the onset after thirty years of age. In 30.8 per cent of the unilateral cases symptoms developed between the ages of twenty and thirty, which is in contrast with the 6 or 10 per cent of those with a bilateral family history that manifested symptoms within the third decade.

It may be stated, then, the more complete the familial tendency the earlier the onset of symptoms. In other words, an individual seems to be destined by heredity to begin to exhibit symptoms of hay-fever or asthma at a certain age in life. The specific sensitivity is acquired, but the ability to become sensitive is inherited. Acquired characteristics are not transmissible. Cut off a dog's hind leg for 999,999 successive generations and still the puppies will be born with four legs. Chinese women are not born with deformed feet. The type of sensitiveness the ancestors suffered from bears no relation to the type the descendant may have,—one may have hay-fever from ragweed pollen and the other asthma from chicken feathers. The individual inherits the tendency and not the specific state. The germ cell is not affected. The transmission of the ability to become specifically sensitive seems to follow Mendel's law. Whether the nature of the inheritance is as a single dominant factor or a recessive factor will require further study. It is the author's opinion, however, and is also believed by Spain and Cooke[9], that if the factor were recessive all the children with bilateral inheritance should have some form of atopy, which does not actually happen.

Of the cases with a negative family history 81, or 20.3 per cent, developed symptoms in the fourth decade and 80, or 20.2 per cent, developed symptoms within the first ten years of life. In general, it seems from our findings in cases of a negative family history that there is no factor to influence the early onset of symptoms.

MULTIPLE SENSITIVITY

In reviewing case histories of positive specific cutaneous reactions one notices a definite tendency for an individual to become sensitive to one particular group of atopens, or if there be more than one group the sensitivity to all except

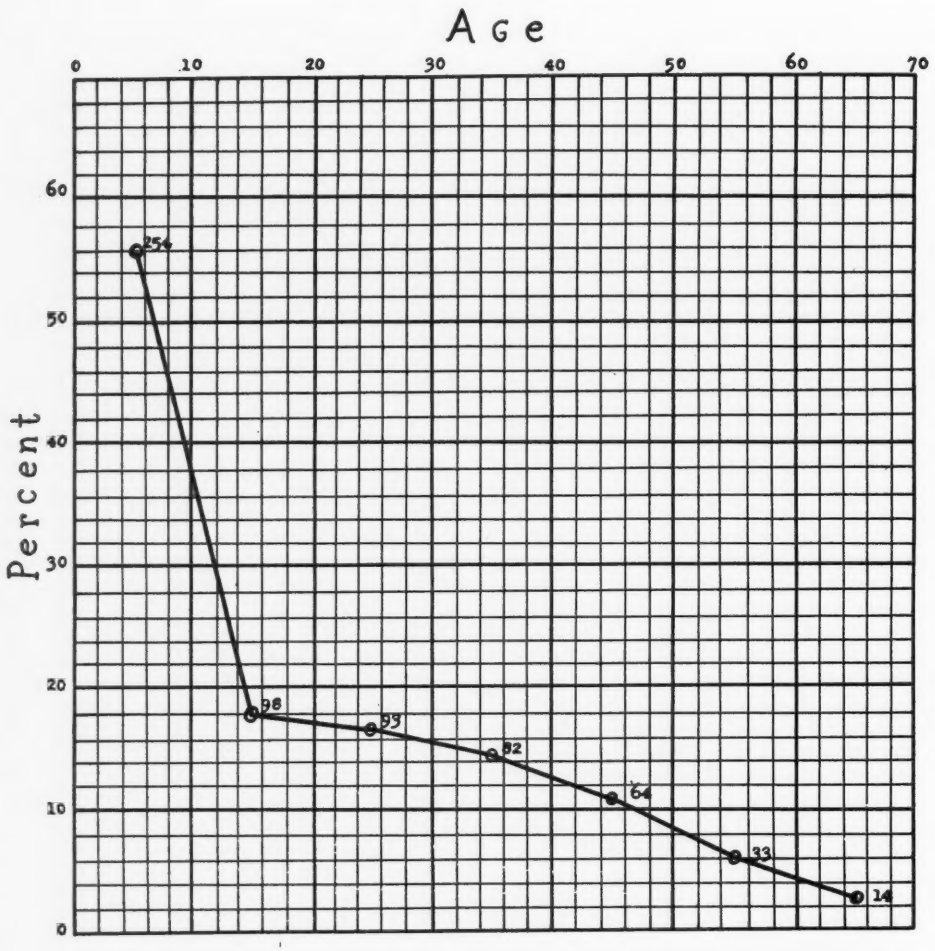

Chart I. Distribution of age of onset of clinical manifestation of bronchial asthma in patients of all ages, based on 540 cases.

one group will be slight. For example, it is common to find patients strongly sensitive to pollen, both clinically and with cutaneous reactions, while they are only slightly or not at all sensitive to other atopens although they have had adequate contact. It is not uncommon to find them sensitive to only one group of pollens or to only one group of animal epithelium; for example, the ragweed group, feathers, or the hair of hoofed animals, although they have had adequate contact with other pollen or other atopens. Our records show that 21 per cent of all cases who developed clinical manifestation of atopy in the first decade show clinical and cutaneous evidence of sensitivity to more than two groups of atopens. The percentage is in sharp contrast to 11 per cent in the second and 6.7 per cent in the fourth decade.

Stuart and Farnham[10] suggest that a child found sensitive to eggs only should be considered a candidate for a multiple sensitive case in later years. There appears to be a definite tendency in an individual who develops clinical manifestation of hypersensitiveness early in life to become sensitive to a large number of protein groups.

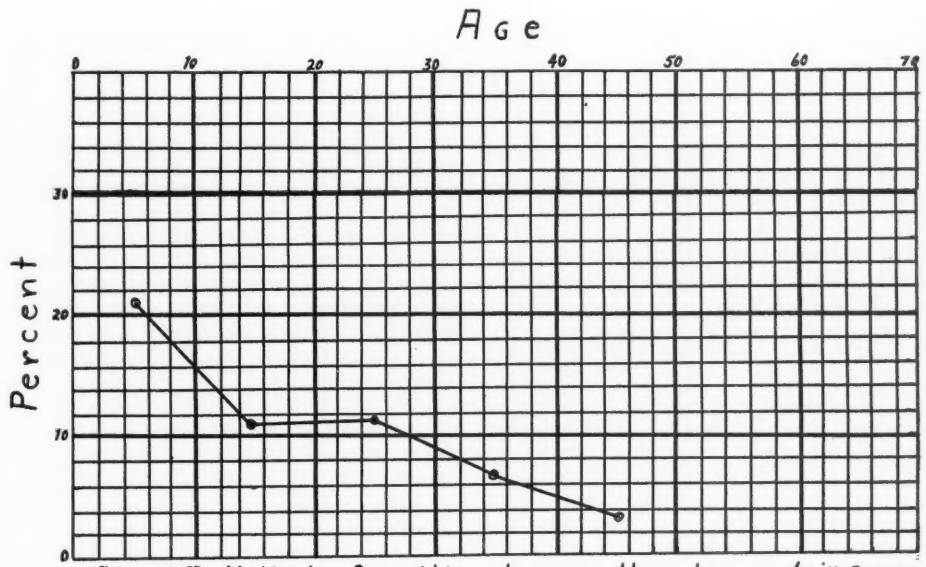

Chart II. Multiple Sensitive to more than two protein Groups.

In a review of the above evidence we are led to believe that inheritance is the chief factor in determining whether or not an individual will ever develop clinical manifestation of hay-fever or asthma, and governs very largely the time in life when symptoms will appear. However, it seems necessary to add that it influences to some extent the individual group or groups of atopen to which the individual may become sensitive, and that the earlier in life clinical manifestations of atopy develop, the greater the tendency for the individual to become sensitive to more than one group of atopens. In the main our conclusions are in accord with those of Coca.[11]

INFLUENCE OF DEGREE OF PROTEIN CONTACT

In discussing the factors that play a part in the acquisition of hypersensitiveness one other than heredity surely deserves consideration, namely, the degree of contact. A study of our cases shows a definite tendency for patients to become sensitive to the atopen with which they come in contact in massive doses. For example, a miller with an atopic family history will not uncommonly become sensitive to wheat flour, while a rancher with a similar ancestral history will more probably become sensitive to animal epithelium. Again, the laboratory worker will have a tendency to become sensitive to guinea pig hair, if he is born with that ability, while the druggist would be more likely to become sensitive to powdered epicac. Peshkin,[12] in a study of 100 cases of asthmatic children in Jewish families who sleep on rabbit hair mattresses, found 49 per cent sensitive to rabbit hair, while in a similar series we found 43 per cent sensitive to feathers and only 2 per cent sensitive to rabbit hair. Patients who live in the Russian thistle district of Oklahoma, where the growth of thistle is extremely heavy, frequently become sensitive to Russian thistle pollen but seldom to ragweed, while the findings are just the reverse in middle and eastern sections. The author[13] has previously shown in a series of 384 seasonal hay-fever cases that 119, or nearly one-third, first developed manifestations of hay-fever between the ages of fifteen and twenty-five, or, in other words, the first time they would be likely to come in contact with massive amounts of pollen.

From the evidence just presented we believe that the extent to which an individual is exposed to any given atopen has much to do with determining whether or not a sensitivity to that particular atopen will develop.

It is generally believed by men working in the field of allergy that an individual must come in contact with a given protein, either by ingestion or inhalation, before he can possibly become specifically sensitive to it. Pediatricians have frequently asked the following question:

"If a child must come in contact with certain proteins before he can become specifically sensitive to them, then when did the child who showed allergic manifestations the first time cream of wheat was added to the diet, come in contact with wheat proteins?"

Cooke[14] has suggested that split products of protein may come to the child through its mother's milk but he further states it is hardly conceivable that protein could come unchanged through that channel.

I wish to present three cases and discuss briefly the possibilities of the time in life they became specifically sensitive.

Case 1.—B.J.M., a girl, age 5 months, showed symptoms of asthma and eczema at four months of age. She was nursed by the mother about three weeks, at which time, due to lack of milk supply, she was put on Eagle Brand milk, but gained poorly. Three weeks prior to the onset of symptoms her diet was changed to modified cow's milk. Her asthmatic attacks occurred daily and had persisted about one month at the time she was first seen by us. An antecedent family history of hay-fever and asthma was prominent. Food tests showed a four-plus reaction to wheat and to no other food protein. The question of wheat contact immediately arose. The nurse accompanying the baby informed us that the milk supply came from a cow fed on bran. This child was put on milk coming from cows fed on green wheat pasture, with the result that she became symptom free. This case has been under observation the past two years. The mother has reported that the child has had a number of attacks of asthma and hives following the eating of a small piece of bread.

Two questions naturally present themselves: first, when did the child become specifically sensitive to wheat; second, what was the source of the wheat protein that was causing her asthma? In answering the first question, there are only two possibilities. First, she was either born specifically sensitive, or split products of wheat, or some products, probably non-nitrogenous in character, came down through the mother's milk, or through the cow's milk, thereby bringing her in contact with them to the extent that it was possible for her to develop a specific sensitivity. Only one answer to the second question can be given: a substance to which she was specifically sensitive came down through the cow's milk.

Case 2.—M.F.B., a girl, age 3 years, developed hives associated with a severe diarrhea at four days of age. At three weeks of age eczema appeared and at three months asthma manifested itself and has occurred almost daily for the past two and one-half years. At the time that all three symptoms mentioned developed, the diet was that of mother's milk. Several members of the family, one being the father, had had asthma. Cutaneous tests proved the child to be four-plus sensitive to both eggs and wheat. Clinically eggs and wheat were the cause of her symptoms as removal of these foods freed her of them.

Again two questions naturally arise: first, when did this child become sensitive to eggs and wheat; second, what was the source of the egg and wheat protein that was causing her symptoms? There are two possible answers to the first question. First, it is possible that she received enough wheat and egg protein through the mother's milk supply during the first three days of life to allow her to become sensitive to wheat and egg protein, or some non-nitrogenous substance associated with them, and the specific food sensitivity was the cause of her symptoms at four days of age, but it is not very probable. The other answer is that she was born specifically sensitive to wheat and egg protein, and it is the author's judgment that this is what actually occurred. The source of the egg and wheat protein that continued to cause symptoms was undoubtedly some form of protein or other substance from the above products that appeared unchanged in the mother's milk, inasmuch as no other food had been taken when the first symptoms appeared.

Case 3.—L. M., a boy, age 18 months, showed typical asthmatic wheezing the first day he was born, and such symptoms appeared almost daily during the 18 months before I saw him. The grandparents on both sides of the family had asthma; the mother had hay-fever. Protein tests revealed a four-plus reaction to wheat and eggs. Elimination of these two foods freed him of asthma and he has continued to remain free during the past eight months.

The chief question in this case is when did he become specifically sensitive to wheat and eggs? There is logically only one answer. He was born specifically sensitive.

The cases just reported and the history of a few other cases we have on record have caused us to believe that children may be born specifically sensitive to a food protein or they may receive some substance in sufficient quantity from the mother's milk, or from cow's milk in some cases, to allow them to become specifically sensitive.

Stuart and Farnham[10] state that the hypersensitivity to food proteins tends to be present at birth, although they give no definite clinical or experimental evidence. In observing atopic cases we can not help being impressed with such a possibility.

PROTEIN TESTS ON THE NEW BORN

As a means of substantiating or disproving the correctness of our conclusion that a child may be born specifically sensitive, we made cutaneous tests on 119 new born babies. The babies were all tested before they were three days old and the tests on most of them were done on the second

day. Three food proteins were used, namely, eggs, wheat and casein. We found reactions easy to read inasmuch as the skin of infants reacts very slightly to trauma from the scalpel compared with the same amount of trauma on the skin of adults. Baby No. 40 showed a four-plus reaction to wheat which lasted one hour and ten minutes. Baby No. 90 gave an unquestionable three-plus reaction to egg protein, which persisted for fifty minutes. Both reactions proved positive on repeating the test. One of these cases had no history of atopy in the ancestors. A history could not be obtained of the antecedents of the other child inasmuch as little was known concerning the parents.

During embryonic life, food products, bacteria and antibodies from the blood of the mother enter the arterial system of the child with practically no change. This throws into the blood stream of the embryo food products of all sorts. Coca[11] states that

"an atopic individual, under adequate conditions of contact with the respective atopen, may be destined by heredity to begin to exhibit a particular clinical form of atopy (hay-fever or asthma, as the case may be) at a certain age of life, and it may also be determined in the inheritance to which particular atopen, or group of atopens, the individual is to exhibit the hypersensitiveness."

If heredity predetermines whether or not a child is to become sensitive, which is Coca's idea and appears to be true from our own findings and those of Cooke and Spain,[9] then during embryonic life there is no reason why a child with the inherent ability should not in some cases acquire a specific sensitivity to food protein or a non-nitrogenous product associated with the protein while *in utero* and therefore be born specifically sensitive. We believe the above explanation may answer the question of the pediatrician, "When did this child become sensitive?"

SUMMARY

(1) Inheritance appears to be the chief factor in determining whether or not an individual will ever develop clinical manifestations of hay-fever or asthma, and largely governs the time in life when symptoms will appear.

(2) An individual may be destined by heredity to develop a sensitivity to a certain group, or groups, of atopens.

(3) The earlier in life an individual becomes sensitive, the greater the tendency to develop a sensitivity to more than one group of atopens.

(4) The extent to which an individual is exposed to any given atopen has much to do with determining whether or not a sensitivity to that particular atopen will develop.

(5) The substance to which patients become specifically sensitive clinically is a non-nitrogenous one, probably enzyme in character.

(6) Clinically, the substance, whether protein or non-protein, to which patients become specifically sensitive, is found in cow's milk and breast milk.

(7) A child may be born specifically sensitive to food protein, or a substance closely associated with it.

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SIGNIFICANCE OF NEGATIVE SKIN TESTS IN POLLEN HAY-FEVER AND ASTHMA IN INFANTS AND YOUNG CHILDREN: TREATMENT*

By I. S. KAHN, M.D.,
San Antonio, Texas.

The necessity of considering the possibility of atmospheric pollen as an etiological factor in every case of bronchial asthma in the Southern states was taken up by me before this Association at its meeting two years ago.[1]

The means by which pollen could be proven of etiological importance in bronchial asthma in the absence of the usual positive skin tests, has also been taken up elsewhere.[2]

By proper manipulation of pollen extract sub-

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cutaneous dosage to the point of local reaction at the injection site and the production of mild hay-fever or asthma, the threshold of tolerance can be learned in every pollen asthma case, and it varies widely. Determination of this degree of sensitiveness can not invariably but usually can be reasonably accurately made in a far more simple manner by the intradermal tests done with extracts of various dilutions from 1:100,000 up to 1:50.

In certain adults with pollen hay-fever or asthma, this threshold of tolerance is very high. The average commercial extract for the intradermal test is a 1:50 extract, and this strength is rarely exceeded in the usual allergic clinic, as it will reveal the vast majority of pollen sensitive cases in most environments. However, the failure to secure such positives does not mean the total absence of pollen sensitiveness nor that such an individual will not have asthma from an environment of high pollen concentration, as in some individuals even a 1:20 extract given hypodermatically is required to demonstrate this sensitiveness. In some sections of the United States, 0.5 c. c. of a 1:50 extract will ordinarily give full protection against pollen. In others, a similar dose of a 1:20 extract is required. A case whose threshold of pollen tolerance is well in the 1:20 dilution class may not give a positive intradermal test to a 1:50 extract, and will seldom or never have asthma in any section where a 1:50 or lesser extract protects.

The following case is an example of a high degree of pollen tolerance:

M. L. A., merchant, age 45, was first seen June 23, 1927, with a history of severe daily and almost continuous asthma for one and a half months, the attacks being worse at night. He had always lived in one of the Southern States. For several years previously, he had had light touches of hay fever and bronchitis of minimal annoyance.

Intradermal tests with many foods, feathers and animal hairs were negative. Pollen tests were negative even with 1:20 extracts. In eye tests with pure pollen, ragweeds were negative, and grasses slightly positive. Environment tests were positive; that is, he would lose his asthma in a downtown hotel room, comparatively free from pollen, only to have it return at once in the residence districts or on a country automobile ride.

Subcutaneous pollen injections:

	Giant Ragweed	Timothy
June 23	0.05 c. c. 1:5,000	0.05 c. c. 1:5,000
25	0.05 c. c. 1:500	0.05 c. c. 1:500
27	0.04 c. c. 1:50	0.04 c. c. 1:50
28	0.03 c. c. 1:20	0.03 c. c. 1:20
29		0.05 c. c. 1:20
		slight positive local reaction

Injections gradually increased.
July 11 0.3 c. c. 1:20 (N. mg. 0.1) 0.25 c. c. 1:20 (N. mg. 0.125)
Definite positive reaction to both.

The first evidence of sensitiveness was secured in this case with a dose it is seldom necessary to exceed in most parts of the country to secure almost perfect desensitization. Beginning relief was secured early in August with a dose of 0.6 c. c., and practically complete relief was obtained when 0.8 c. c. was reached.

Cases of the above type of both hay-fever and asthma are not uncommon in the South in my experience. In other words, unless a case of asthma tolerates subcutaneously something approaching the maximum dose of pollen extracts required in his community for protection, skin tests or no skin tests, there is no assurance that the case is not a pollen case with asthma at times from this source from occasional atmospheric pollen overdosage, no matter what may be his other known antigenic irritants. This explains the failure to secure results in some asthma cases giving positive skin tests to feathers and animal hair, foods, so forth, following the removal or avoidance of these factors. Such cases have asthma only in an environment of constant high atmospheric pollen, or in localities of a lesser pollen environment only during high winds or accidental contact with massive dosages by close weed or grass contact, as for example, in handling hay or fodder.

This question of asthma symptom production in cases of low degrees of sensitiveness and high threshold of tolerance with negative or minimal pollen skin tests becomes of decided interest in studying asthma in infants and young children as seen from the following tables.

A

Age of Symptom Incidence in 100 Pollen Asthma Children

1 mo. or under	1
1 to 6 mo.	2
6 to 12 mo.	7
1 to 2 years	22
2 to 3 years	17
3 to 4 years	17
4 to 6 years	15
6 to 8 years	8
8 to 10 years	7
10 to 12 years	4

In 5 of these cases hay-fever symptoms existed from birth.

In studying the above table, it will be noticed first that 33 per cent of the cases of childhood asthma of pollen origin in this series date the inception of the trouble in the first two years of life, and 50 per cent before the end of the third year, 66 per cent by the end of the fourth year, and 80 per cent by the end of the sixth year. It is thus seen that definite pollen asthma may begin very early in life. According to the mothers' stories, five of these children were practically born with hay-fever.

A positive family history was secured in 80 per cent of these cases of either hay-fever or asthma. This high figure makes it probable that if we could trace the real family history in the other 20 per cent, overlooked or unrecognized hereditary sensitiveness would be found in various ancestral cases of old chronic so called catarrh or bronchitis.

This combination of heredity and early symptom onset is highly suggestive that the condition of pollen cellular hypersensitiveness may be natal or prenatal, and not acquired. If acquired, these figures show that it may evince itself within a comparatively short time after birth. Further corroboration of this point of natal or early post-natal hypersensitiveness is seen from the pre-asthma history of even the very young children of this series. Practically invariably, the initial asthma paroxysm was antedated by weeks, months, or even years of intermittent attacks of frequent so-called "colds" and bronchitis, all unimproved by adeno-tonsillectomy or our usual cold bronchitis treatments, in other words, the well recognized symptoms of pollen vasomotor rhinitis and tracheo-bronchitis. The asthmatic paroxysm is not the first evidence of pollen hypersensitiveness in children. The hay-fever in young children is usually of so mild a type that the actual etiology of the nasal blockage and discharge is easily overlooked, but detectable without much difficulty if attention is turned in that direction.[3] In other words again, the asthmatic paroxysm even in very young children is not the first evidence of pollen hypersensitiveness.

The relation of positive or negative skin tests to pollen sensitiveness according to the age of the child when first seen is of no practical value, as such tests might have been made in one child of eight after one month of asthma, and in a second of the same age, after eight years of asthma. However, in studying this relationship to the duration of the asthma as shown by the following tables, a very interesting state of affairs is revealed.

A

Relation of Positive Causal Pollen Skin Tests to Duration of Asthma in 88 Cases.

	Positive	?	Negative
1 mo. or less	1	1	0
3 mos. or less	1	0	0
4 months	1	1	0
6 months	1	1	1
9 months	0	0	2
1 year	5	4	2
2 years	2	2	2
3 years	7	3	3
4 years	7	0	1
5 years	5	2	1
6 years	7	0	4
Total 6 years or less	39	14	16

B

Relation of Positive Casual Pollen Skin Tests to Duration of Asthma in 88 Cases:

	Positive	?	Negative
7 years	10	1	0
8 years	3	0	0
9 years	1	0	0
10 years	1	0	0
11 years	1	1	0
12 years	1	0	0
Total, 6 years or less	39	14	16
7 years or more	17	2	0

In studying these two tables, it will be noted that while in the children in whom the disease had lasted seven years or more, the percentage of negative or questionable tests was negligible, on the other hand, with those in whom the asthma has lasted 6 years or less, the percentage of questionable or negative tests reached the respectable figure of 40 per cent, and in infants and children up to two years of age, equalled the number of positive tests secured.

Only one deduction can be made from these tables; namely, that pollen hypersensitiveness increases with the duration of the disease, and conversely, the shorter the duration of the disease, as a rule, the lesser the degree of sensitiveness. In other words, as a general rule, the pollen sensitiveness of the child at the onset of his asthma is minimal in degree.

About two years ago, I was struck by the idea that it might be possible to take advantage of this low degree of sensitiveness in infants and young children, and by proper precautions against pollen overdosage, prevent the natural tendency to a gradual increase in hypersensitiveness without the institution of specific desensitization methods, and if a "cure" could not be made, at least control the asthma to the point of one or two light annual attacks not worth the effort of desensitization.

Practically, this was done, and especially with emphasis during the height of a given pollination season, by placing the child in a room instead of on a sleeping porch, by selecting a sleeping room as far as possible away from empty lots and away from prevailing winds, by keeping bedroom windows closed when climate conditions permitted, by placing the bed out of a direct air current when necessary to open windows, by using apartments in a closely built up neighborhood when practical, by the avoidance of long country rides or playing in empty lots, by keeping the child indoors during periods of high winds and by a seashore in summer. Of great assistance in this line is a window pollen filter, several devices of which are practical. Once clear of their asthma or hay-fever, nocturnal precautions, the avoidance of pollen for ten

or twelve hours, seem all that is required, and except in periods of high winds, these children can then be left to play outdoors as desired, like ordinary non-sensitive cases. Many, so handled, seem able to tolerate the amount of pollen received during daylight hours.

I have at the present time 22 of these cases which have been under observation for periods varying from four to eighteen months. All have improved in the sense of an appreciably lessened number of attacks, and in 17 (75 per cent) the results are practically perfect. The duration of observation is of course too short, and the number of cases too few, to determine the value of this method in permanently abating the asthma. However, at the present writing it seems as rational a procedure, with results as promising as the rest cure alone in early tuberculosis. As might be expected, it is with the cases of more marked hypersensitiveness giving strong typical skin tests or reacting to weak pollen extracts given subcutaneously that precautionary measures alone fail. Fortunately, infants and young children with asthma of short duration as has been seen, seldom fall into this class. This condition of typical adult sensitiveness exists in children usually only when the asthmatic state is of several years' duration.

In addition to the above 22 cases, 9 others seen during the current ragweed pollination season, locally a heavy one, have been kept perfectly comfortable without specific measures. It should be added that none of these children so relieved has received medication of any kind.

The following case is typical:

C. W., age 3, was seen July 21, 1926. Her first attack of asthma was in October, 1925, the next in April 26, 1926, with a recurrence of asthma every few days since. She had had eczema and still had it. She had very frequent colds and sneezing during his entire life. She had adeno-tonsillectomy in October, 1925, a few days before the initial asthma attack.

Intradermal skin tests were positive to milk, egg, dog hair and cat hair; questionably positive to the ragweed, and slightly positive to grasses.

Correction of diet in accordance with the positive skin test foods and elimination of dog and cat hair contact had no effect on the asthma. The usual pollen environment tests were positive. Under the general precautions mentioned, in the last 17 months, there has been but one attack of asthma, not of sufficient severity to require epinephrin, and the mother states in October 1927 at the height of the ragweed pollen season, that the child is not only without any signs of hay-fever or asthma, but also for the past year has been remarkably free of her previously almost constant colds or nasal troubles. She thinks the child has "outgrown" her asthma.

We can go even a step further and handle these pre-asthmatic vasomotor rhinitis bronchitis babies. Naturally, first, of course, the cases must be recognized as such and differentiated from bacterial infections. In the absence of positive skin tests, they can be detected first, by the presence of hay-fever or asthma in one or both parents or some close relative, by the failure of adeno-tonsillectomy, by the failure to secure relief by vaccines or ordinary cough mixtures, and by the immediate relief of the condition by epinephrin or ephedrin administration and a strict closed up indoor existence out of pollen. I have seen several such cases who have lost all tendency to colds and bronchitis and all nasal blockage and mouth breathing by these simple precautions.

Much to my surprise and gratification, this indoor existence, even when strictly observed for weeks on a stretch, has been followed by marked improvement in weight and general health.

CONCLUSIONS

(1) The skin tests to pollen, even intradermally done, in infants and young children suffering with pollen asthma, are very frequently either entirely negative or only slightly positive.

(2) Such negative or weak positive tests actually indicate a minor degree of hypersensitiveness.

(3) Advantage can be taken of this low degree of sensitiveness in initial or early cases of asthma to hold these children free, or nearly free from asthma by proper precautions against pollen overdosage.

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HEMIANOPSIA AND BRAIN TUMORS*

By MARVIN G. PEARCE, M.D.,
Houston, Tex.

The occurrence of hemianopsia in its various forms (temporal, nasal, homonymous, heteronymous, altitudinal) is always a valuable sign in the localization of brain tumors. It has no absolute value *per se* except that its presence

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always means a lesion in or affecting the visual pathway. But when taken into consideration along with other signs and symptoms it is often a light in the dark. Thus, a perimeter should be in the hands of every neurologist or his consulting ophthalmologist and the visual fields for form and color should be carefully mapped out in every neurological examination.

It may be well here briefly to call to mind the course of the visual tract. Anatomically, it will be remembered that the optic fibers pass, in the optic nerve trunk, from the retina to the optic chiasma. Here there is a decussation of such a character that in leaving the optic chiasma, the right optic tract contains the fibers from the right halves of both retinae, and the left tract contains the fibers from the left halves. The optic tracts carry the optic nerve fibers dorsally and wind around the cerebral peduncles, from where they pass to the primary visual centers of the same side. The fibers end here, but the retinal stimuli are further conveyed from the primary visual centers to the cortical visual area of the same side. The cortical visual area is situated in the cuneus and the upper part of the gyrus lingualis, on the inner surface of the occipital lobe. Retinal stimuli are also carried from the superior quadrigeminal body to the retinal nucleus (nucleus of Edinger and Westphal) of the oculo-motor nerve. By these latter fibers reflex contraction of the pupil on stimulation of the retina by light is accomplished. From the visual cortex (area striata) association fibers pass to the lateral surface of the occipital lobe and the inferior parietal lobe. The optic radiation, as it passes back toward the occipital area, is immediately subjacent to the temporal lobe; so that frequently the fibers of the optic radiation are more or less implicated in tumors of this region.

Hemianopsia is frequently seen in lesions around the chiasma. L. C. Peters[1] remarks, in writing of diseases of this region, that

"Perimetric studies in diseases of any part of the visual pathway have localizing value. In no part, however, are the findings so definitely localizing as in diseases in and about the chiasm."

Thus in tumors involving the inner part of the chiasma, bitemporal hemianopsia is a common finding, the most probable situation of the lesion in this case being the pituitary gland, the infundibulum or the third ventricle. If unrecognized, the affair tends to progress to total blindness in one eye and temporal hemianopsia in the other and still later to blindness in both eyes. Quadrantic anopsia[2] is sometimes seen in tumors of the pituitary gland; but it is most generally noticed in tumors situated in the temporal lobe. A characteristic of the existing hemianopsia in the pituitary region is that it is apt to be of almost any type and even the type, itself, is often atypical. In pituitary tumors there may be constitutional symptoms and signs of disorders of the various pituitary secretions. In such a case the diagnosis is made much easier. In tumors of the third ventricle an important and frequent finding is persistent somnolence. In supra-sellar tumors, such as those involving the choroidal fissure or uncus, homonymous hemianopsia may be present. Nasal hemianopsia of heteronymous type may be seen in lesions in which only the outer portions of the decussations of the optic nerve are destroyed. The writer recently saw a patient who was found to have a hypophyseal cyst bulging laterally, and in whom the above type of hemianopsia was seen.

In tumors of the optic tract, primary visual centers, and central visual tract, either right or left homonymous hemianopsia is seen, depending on the side of the lesion. Here if the lesion is peripheral to the point where the reflex fibers to the Edinger-Westphal pupillary nucleus are given off, there is hemiopic pupillary inactivity; if, however, the lesion is central to that point, there is hemiopic pupillary activity. This is known as Wernicke's phenomenon.

Homonymous hemianopsia is also seen in tumors in the area above the primary centers. This area includes the cuneal cortex and the upper part of the lingual gyrus. In lesions of the white matter of the occipital lobe and the angular gyrus this type of hemianopsia also occurs. But along with it appear other distinctive signs such as "object blindness," "word blindness" alexia, the last being indicative of a lesion affecting the left angular gyrus. In the diagnosis of tumors of this area it is important to keep in mind a remarkable differential point, namely, that in lesions of the optic tract the resulting homonymous hemianopsia reveals itself as a positive scotoma. That is, the patient himself is aware of a black patch covering half of his field of vision. But if a tumor in an occipital lobe is blocking his visual apparatus, he is not aware of it and it can be found only by a careful field examination.

Dr. Purves Stewart[3] reports the case of a patient forty-eight years of age, mentally confused for some weeks, in whom a paralysis of the left arm and leg rapidly developed, and in whom there was a left side hemianopsia of which the patient was not conscious. Because of the advancing hemiplegia an operation was done over the right fronto-parietal area. No tumor

was found. At autopsy it was discovered in the posterior portion of the right occipital lobe, involving both cortex and subcortex. He remarks, "on consideration of this case, it is seen that the mistake which we made in decompressing over the motor cortex instead of over the occipital lobe was due to our being misled by the occurrence of the rapidly advancing hemiplegic symptoms. These diverted attention from the original hemianopsia, the focal significance of which ought to have been more firmly realized."

In tumors of the angular and supra-marginal convolutions hemianopsia of the homonymous type may occur on the side opposite the lesion. The usual accompanying signs that may be helpful are: hemi-anesthesia, hemi-analgesia when the lower end of the internal capsule is affected, word blindness, visual agnosia and loss of accuracy in the perception of depth and distance.

In tumors of the temporal lobe, more or less complete hemianopsia occurs after there is implication of the fibers of the subjacent optic radiations. This is particularly true in tumors of its antero-internal aspect. Often in these cases the classical uncinate fits and gustatory phenomena are absent, as are the dreamy states, in fact, very little of focal nature is present. At these times it is most gratifying to discover a hemianopsia. Dr. W. I. Lillie[4] believes that an ocular syndrome can be established for early temporal lobe tumors, namely, normal visual acuity, bilateral choked discs and quadrant Anopsia of the homonymous type for either form or color. These quadrant defects of course when seen later have developed into a complete obscurity of half the visual field. The following case presented a confusing picture, indeed, and the presence of hemianopsia did much to clear it, though it did not completely do so.

A young woman twenty-six years of age had been having light fainting spells over a period of three years. There were occasional headaches which were occipital in nature and dizzy spells. She was well developed and had a tendency to tilt her head to the right. Both optic discs were hazy but did not show full choking; there was slight central weakness of the left seventh cranial nerve; adiodokokinesis was present on the right; the patient could not walk a straight line and could not stand on either foot; there was a tendency to fall to the right; Chaddoch's sign was positive on the left; the right knee jerks were increased over the left and the right upper abdominal reflex was diminished; the visual acuity of both eyes was lowered, more so in the left eye; convergence was markedly insufficient, and there was a complete right hemianopsia with absolute scotoa. Wernicke's phenomenon was positive indicating a lesion behind the chiasma and in the optic tract. The patient was sent to Dr. Harvey Cushing and he operated in the region of the left occipital lobe. No tumor was found. Later he removed a large glioma from the left temporal lobe.

In this case the finding of right homonymous hemianopsia definitely placed the tumor on the left side. But as there were no accompanying temporal lobe phenomena; as there were persistent occipital headaches; and as the cerebellar signs pointed to probable involvement of the cuneus and lingual gyrus a diagnosis of occipital lobe tumor was made. Dr. Cushing confirmed this with the above result. In this connection Perves Stewart states that Wernicke's hemiopic pupillary phenomenon is absent in hemianopsia from occipital lobe tumors. It was present in this case, so that here was an important guide that was overlooked. There were frequent convulsions but they were general and showed no definite focal character. However, general epileptiform attacks are often seen in tumors of the temporal lobe; so that the occurrence of these, together with the presence of the hemiopic pupil in the existing hemianopsia should have argued strongly for the implication of the temporal lobe.

SUMMARY

(1) Attention is called to the importance of mapping of the perimetric fields for form and color in all neurological examinations.

(2) A brief anatomical description of the visual pathway is given.

(3) The common forms of hemianopsia are discussed with their possible and probable meaning in the localization of the tumors of the brain. In this discussion the following areas are considered: the pituitary gland and the region of the optic chiasma; the optic tract, the primary vision centers, the central visual tract; the occipital lobe; the angular and supra-marginal convolutions and the temporal lobe.

(4) One case of mis-diagnosed temporal lobe tumor is recorded and observations made as to some important existing phenomena, which, had they been duly considered, might have changed the pre-operative diagnosis.

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DISCUSSION (*Abstract*)

Dr. C. E. Dowman, Atlanta, Ga.—There are two instruments that every neurologist and every neurological surgeon should have at hand. One is a perimeter and the other is an ophthalmoscope. The neurologist should do his own perimetric studies, because the average ophthalmologist is too busy to take the time necessary to make careful visual field studies. It is a mistake to take visual fields with a large disc. We have found that such fields are very confusing. The method devised by Sachs which one can easily use with the average perimeter and which can be used in the dark room, is very useful, especially with a little light in the center of the perimeter.

Knowing that I was down for a discussion of this paper and having an interest at the present time in analyzing some brain tumors, I selected one-hundred brain tumors (verified by microscopic section) from our series of the last five or six years. In 100 cases of verified intracranial tumors visual field studies were made in 82. In six cases there was total blindness which prevented taking the visual fields. In twelve cases the patients were either unconscious or unable to cooperate in the examination. Normal visual fields were present in 59 cases. In the 23 abnormal fields the following facts of localizing value were brought out in 16: there was homonymous hemianopsia in six cases (three temporal lobe, two occipital lobe and one multiple tumor in which one of the tumors involved the optic tract); bitemporal hemianopsia in four cases (a cerebellar pontine angle tumor and three chiasmal tumors). There is an explanation in regard to the cerebellar pontine angle case. This patient had a very marked internal hydrocephalus with a greatly distended third ventricle which actually pressed down on the optic chiasm and changed the visual fields. It is to be kept in mind that a distended third ventricle may cause hemianopsia. There was a nasal hemianopsia on one side in two cases (two chiasmal tumors); a temporal cut-off on one side in four cases (three chiasmal and one post-central tumor); a general constriction in five cases, a finding which had no localizing significance.

One thing that will certainly help us in localizing brain tumors, is the discovery of a defect in the visual fields.

In these 100 verified brain tumors there were normal fundus findings in only 14. In the 86 remaining cases in which there were abnormal fundus findings, there were only congested retinal veins in four cases; slight choking in eleven, marked choking, (above three diopters) in 55, atrophy without choking (some primary and some secondary) in fourteen cases, and arteriosclerosis only in two cases. There were retinal hemorrhages associated with choked disc in 28 cases.

Dr. R. Glenn Spurling, Louisville, Ky.—The type of perimeter that we use was copied from the one used at Dr. Cushing's clinic. A black cloth 9x12 feet is placed on the wall. In the center of this a white spot, 1 cm. in diameter, is placed. Circles around the point are dimly outlined, the first circle having a radius of 14 inches, the second 28 inches, the third 42 inches. Test objects of 2 mm., 5 mm. and 1 cm. are used. The fields are outlined in the usual way. The chair is placed two meters from the perimeter, and care is taken to have constant lighting and to avoid all extrinsic noises or objects that will distract the patient's attention. We use a black gown with a hood and black gloves during the test. We find this to be a very accurate method of studying central vision, as very small defects can be outlined. We have not been taking color fields, although I realize that this would be of distinct advantage in certain cases.

Dr. Pearce (closing).—It was my desire to call to mind the frequent occurrence of hemianopsia in brain tumors. It is a very valuable sign when it occurs and when it does not occur it is also valuable because it helps to a great extent to exclude the areas affected by the visual apparatus. It is most important therefore that a careful examination of the fundi together with careful measurement of the visual fields be done in every neurological examination.

THROMBO-ANGIITIS OBLITERANS*†

By THOMAS G. ORR, M.D.,
Kansas City, Missouri.

The recognition that thrombo-angiitis obliterans is a universal disease has stimulated considerable interest in its study and treatment. When Buerger[1] described and named the disease it was believed that it occurred almost exclusively in the Hebrew race. It has been found to be quite common among the Japanese and recently reports have appeared of its common occurrence in many races. None of the patients we have studied has been of the Jewish race.

The etiology of the disease is still obscure. The pathology indicates that it is an inflammation although to date the infecting organism has not been isolated. Difficulty in discovering the organism is quite to be expected since the disease causes disabling symptoms only as a result of its healed process which obstructs the circulation. Inability to grow an organism from the tissues is, of course, not positive evidence against infection. It is just as reasonable to believe that certain strains of bacteria will attack blood vessels as the joints or other particular parts of the body. With the evidence we now have of the selective action of streptococci it is a weak point in our imagination not to believe it possible that the peripheral blood vessels may be the part selected. In addition to infection, syphilis, typhus fever, sugar intolerance, endocrin dyscrasia, increased viscosity of the blood, toxemia and cigarette smoking have all been discussed as etiologic factors, but none has been definitely proved a cause.

Unfortunately the onset of the disease is usually insidious and often irreparable damage is

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†From the Department of Surgery, University of Kansas.

done when the patient is first seen. The first symptoms may be cold and numb feet in inclement weather, pain or burning in a toe, sole or ankle, and in many cases cramplike pains in the calf of the leg or foot after walking (intermittent claudication). A patient may give the symptoms very little consideration until there is some break in the skin of a toe, a discharge from beneath or around a nail or definite ulceration. When these lesions develop the pain is usually sufficiently severe to cause the patient to seek medical aid. Before the onset of ulceration there exists a redness of the toes (rubor) which is increased in the dependent position and gives way to blanching when the extremity is elevated. After trophic disturbances appear pain is often so severe that it becomes almost unbearable. The patient will do anything or accept any treatment to get relief. I recall one patient who begged for amputation to put him out of his misery. In many cases morphine will not bring rest. There is no chronic disease in which pain is a more important factor. After weeks or months of unrelenting pain and suffering a patient may threaten suicide or develop a psychosis.

On examination the toes and feet are usually red or slightly cyanotic when dependent and blanched when raised above the body level. Pulsation in the dorsalis pedis and posterior tibial arteries is absent. In some cases the popliteal pulse cannot be felt. Ulceration, infection or gangrene of one or more toes may be present. A brawny edema may involve the foot and leg. If lesions of the toes exist there may be extreme tenderness and general evidence of intense suffering. In a small percentage of cases the hands may be involved, but rarely do lesions of the upper extremities develop extensive ulcerations and gangrene.

The pathology of the disease is that of a true angiitis which involves the intima, media, adventitia and perivascular tissues. This leads to thrombosis followed by organization of the thrombus partially or completely obstructing the vessels. The artery, vein and even the nerve may all be involved in the inflammatory process forming a rigid cord-like structure as a result of the perivascular fibrosis.

A diagnosis is quite easily made in most cases providing one is familiar with the disease. It is appropriate to state before this assembly that the condition of one of my patients was diagnosed foot strain by an excellent orthopedic surgeon and a leather insole was recommended. Another was thought to have broken arches; a third, Raynaud's disease; a fourth had an operation for varicose veins; a fifth was treated in the Army for rheumatism; a sixth was called flat foot and infectious myositis; a seventh trench foot, and later Raynaud's disease; and an eighth was treated for infection following injury. It then appears evident from these diagnoses that the medical profession is not generally familiar with this disease. Any persistent, painful condition of the foot or leg in the middle aged should suggest this disease to the physician's mind.

The prognosis is serious. Most cases progress until amputation is necessary because of gangrene, infection and extreme pain. Silbert[2] studied nearly 300 cases and drew the conclusion that almost every case followed for a sufficient length of time eventually came to amputation. Within the first five years of the disease 77 per cent had amputations. The severity of the disease depends directly upon the degree of blood vessel obstruction. Death rarely results unless some complication supervenes.

The treatment of thrombo-angiitis obliterans has been varied. Under surgical treatments suggested may be mentioned ligation of the femoral vein, arteriovenous anastomosis, periarterial sympathectomy, ligation of the femoral artery, lumbar sympathetic ganglionectomy, suprarenalectomy and amputation. Various medical treatments advocated have been mercury, iodides, nitroglycerine, arsphenamin, intravenous sodium citrate, intravenous sodium iodide, intravenous sodium chloride, intravenous typhoid vaccine, Lock's solution through duodenal tube, Ringer's solution, x-ray radiation of sacral region, alcohol injection of nerves, application of moist and dry heat, alternating hot and cold plunges, blood vessel exercise of Bernheim,[3] postural changes of extremity and diathermy. Lewis'[4] method of femoral artery ligation to promote the development of collateral circulation gives some promise, but its value in advanced cases is quite doubtful. Silbert's[2] results with the intravenous injection of hypertonic sodium chloride solution are encouraging, but sufficient length of time has not yet elapsed to prove his treatment of positive value. None of these treatments to date has proven universally successful except amputation. When judging the merits of any treatment it must be remembered that many cases have spontaneous remissions and may live in comparative comfort for months or even years.

Amputation should be done below the knee when possible. Not infrequently a reamputation will be necessary because of infection or gangrene but the advantages of a below knee amputation stump are so far superior to amputa-

TABLE I. STATISTICAL DATA OBTAINED WHEN PATIENT WAS FIRST TREATED.

Patient No.	Nationality	Age	Sex	Duration before examination	Amputation	Extremities	Focal Infection Teeth and Tonsils
1. W.C.	Scotch-Irish	36	M	3½ yrs.	Single thigh	Lower	Yes
2. A.H.D.	Irish	38	M	11 yrs.	Single leg	Lower	Yes
3. A.G.	Irish	45	M	5 yrs.	Single leg	Lower	Yes
4. J.W.	1-8 Indian	48	M	16 yrs.	Single leg	Lower	Yes
5. G.G.	Scotch-Irish	36	M	4½ yrs.	Double leg	Lower	Yes
6. R.B.	German-English	41	M	1 1-6 yrs.	None	Lower	Yes
7. C.H.	American	42	M	6 yrs.	Double leg	Upper & Lower	Yes
8. C.O.McP.	Scotch	34	M	3 wks.	Single thigh	Lower	Yes
9. F.M.O.	French	27	M	5 yrs.	Single leg	Lower	Yes
10. U.J.R.	American	30	M	4 yrs.	Double thighs	Lower	Yes
11. R.G.J.	American	31	M	6 yrs.	Rt. Thigh for GSW in Army	Lower	Yes
12. R.C.W.	Irish-Norwegian	32	M	8 yrs.	Single thigh	Upper & Lower	Yes
13. J.E.H	Scotch-Irish	45	M	10 yrs.	Single thigh	Lower	Yes
14. A.D.	German	30	M	3 mos.	Double leg	Lower	Yes
15. E.W.W.	German	42	M	8 yrs.	Single thigh	Lower	Yes
16. L.L.	Scotch-Irish	41	M	5 yrs.	Single thigh	Lower	Yes
17. J.T.	Negro	54	M	4 yrs.	Single leg	Lower	Yes
18. J.E.	Negro	46	M	3 yrs.	None	Lower	Yes
19. W.S.	German	42	M	5 mos.	None	Lower	Yes

tion above the knee that some risk of operative failure is justifiable in many cases. In the more advanced cases, in which the popliteal pulse is absent, a Gritti-Stokes or supracondylar amputation gives the best results.

During the past four years 19 patients with typical thrombo-angiitis obliterans have come under my observation. These patients were all Gentiles and American born (see table). In one case (No. 7 in table) with hand involvement we injected the brachial artery with sodium iodid after the method of Barney Brooks,[5] to visualize the arterial tree. The pain was so terrific and the shock so great that this method has not been further used. In justice to Dr. Brooks it must be said that we used a local anesthetic instead of gas-oxygen as recommended by him. The only other case (No. 12 in table) in this series with upper extremity involvement had intermittent claudication in his hands when driving a truck. He also had an ulceration of the tip of the index finger with some loss of tissue which was healed. The radial pulses were both absent in this case. One patient (No. 8 in table) insists that he first noted the trouble but three weeks before admission to the hospital. Within six weeks after onset he had a thigh amputation. Another similar case (No. 14 in table) gave a history of but three months trouble which resulted in double leg amputation within five months. These two cases progressed with unusual rapidity if the history is correct. The usual chronicity of the disease makes one wonder if these patients were not mistaken in their statements, although both were quite definite about the time of onset. Case R. B. (No. 6 in table) is interesting because of spontaneous healing of gangrenous toes. The toes have remained well for 5 years without treatment. Case L.L. (No. 16 in table) suffered longer than any other patient of the series. He developed an ulceration at the tip of the great toe and for nearly 4 months slept in an easy chair because of the severity of pain in the foot when he assumed the horizontal position. During the last few weeks before amputation it was impossible to place his foot on a chair for examination or dressing without causing the most excruciating pain. Another patient (No. 1 in table) slept for weeks with his foot in a chair beside the bed to minimize pain. At one time he fell asleep from sheer exhaustion while walking about the ward. This patient had a periarterial sympathectomy without relief. Ligation of the femoral artery below the profunda femoris as suggested by Dr. Dean Lewis[4] was done in A.D. (No. 14 in table) without any relief of pain or improvement in ulceration of the great toe. E. W. W. (No. 15 in table) states that one of his feet became cold very suddenly although he had had symptoms for several years. It felt as if something had suddenly stopped the circulation and he was unable to stand. Within two weeks the foot had turned black. The sudden complete arterial obstruction in his case is somewhat unusual.

Fifteen of the nineteen cases have had one or

both lower extremities amputated. Eight of these were amputated below and seven above the knee. This gives an amputation percentage of 78 plus which corresponds to Silbert's findings.

CONCLUSIONS

(1) The nineteen cases here reported were all Gentiles. Two of this number were negroes. The extreme ages were twenty-seven and fifty-four with an average of thirty-nine years.

(2) In every case there was found focal infection of the tonsils or teeth or both.

(3) In every case there was a history of the use of tobacco but not all were heavy cigarette smokers.

(4) Silbert's statement that nearly all patients followed for a sufficient length of time come to amputation is supported by our observations.

(5) No satisfactory treatment, either preventive or curative, has yet been found which will prevent amputation.

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DISCUSSION (*Abstract*)

Dr. Robert W. Johnson, Baltimore, Md.—If thromboangiitis is discouraging to treat it is also very discouraging to talk about because we know nothing of its etiology.

The most interesting point, to my mind, in these figures is the confirmation of the incidence in males, and also that cases were limited to the Gentiles, because in a mixed population such as we have in the Eastern cities, certainly our figures are very markedly in favor of the Hebrew race.

The point of blockage is always more distant from the gangrene than is apparent and operative changes in the circulation proximal to the block seem to me to have very little effect of overcoming the blockage. As far as pain is concerned, which is a major feature, my own experience has been that periarterial sympathectomy has been quite satisfactory in relieving pain in this condition as it has to be proved in the cases of causalgia. I have had the good fortune to get several cases practically symmetrical as to the symptoms and signs on the two legs, and am at present running through a small series in which I hope thus to get a comparison of the effects of different operative procedures. I think that is the only fair method of comparison, because the disease varies so in individuals that unless we can work on both sides and compare them, we are apt to draw erroneous conclusions.

Dr. Chas. E. Dowman, Atlanta, Ga.—During the earlier part of 1927 there came under my observation two very advanced cases of Buerger's disease. One was an Italian and the other was a Greek. In both of these cases there had occurred gangrene of the toes and feet. In one case several of the toes has been amputated and the wounds would not heal. In the other there had been an amputation of the anterior half of one foot, with a resulting indolent granulating wound which would not heal. There was intense pain in the legs of both patients, the extremities were cold and clammy and no pulsation of the arteries of the ankle could be felt. Neither patient could lie down on account of the severe pain. They both slept in a sitting posture similar to that shown in the film just presented. In both cases a bilateral lumbar sympathectomy with stripping of the adventitia from the common iliac arteries through the abdominal route was performed. After the operations the patients had a feeling of warmth in the legs and feet, the pain disappeared, and they were able to sleep in a prone position for the first time in six years. The pulse in the arteries of the ankles reappeared. These cases were operated upon nine and ten months ago, the ulcerating wounds are thoroughly healed, the patients are up and about, and from last reports are very comfortable in all respects.

Dr. W. B. Carrell, Dallas, Texas.—With complete obliteration of vessels the patient must lose the limb, but preceding this and for a long period, there is partial occlusion, with swelling, claudication and color changes. During this stage palliative and protective measures are beneficial. Particularly I wish to call attention to the relief from that severe type of pain obtained by sympathectomy, in some cases, even when trophic changes are in evidence. Presuming that it is temporary, the result is most satisfactory to the patient and may reasonably be expected to delay the final obliteration of the vessels.

Dr. Henry G. Hill, Memphis, Tenn.—I wish to mention a case occurring in my practice sometime ago, who consulted a very renowned internist. He made a diagnosis of Buerger's disease and the patient was advised to go to Dr. Buerger for treatment. Dr. Buerger concurred in the diagnosis and, according to the patient's history, gave a bad prognosis. He came back to this city and apparently has recovered with practically no treatment.

I wonder whether spontaneous cures ever occur, or was the diagnosis incorrect in this case?

Dr. Orr (closing).—In early cases, or any case, as a matter of fact, all focal infection should be eliminated. Any infected tooth roots or tonsils should be removed, as a part of the treatment. I am thoroughly convinced that the disease is due to an infection which has its source in a chronic infection elsewhere in the body.

CLINICAL SIGNIFICANCE OF OPTIC NEURITIS AND PAPILLEDEMA*

By ADOLPH O. PFINGST, M.D., F.A.C.S.
Louisville, Ky.

It is not unusual for those engaged in the practice of ophthalmology to be confronted with the problem of determining the significance of

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optic neuritis or intra-ocular inflammation of the optic nerve and of papilledema or congestive edema of the nerve. While most of the cases of this kind are seen during an ophthalmoscopic examination made at the instance of physicians engaged in other fields of activity, more especially in surgery and neurology, many cases are discovered accidentally by the oculist incidental to a routine examination of the eyes of patients suffering with headache or impaired vision. As the ophthalmoscope is absolutely essential in the study of these conditions I am impelled here to pay a tribute to von Helmholz, whose ingenuity in 1851 added the ophthalmoscope to our armamentarium and has thereby enabled us to recognize systemic disturbances in their incipiency through an inspection of the background of the eyes.

While it is my intention in this limited paper to consider more especially the clinical significance of optic neuritis and papilledema, I may be permitted to describe briefly the ophthalmoscopic changes in the optic nerve head as they occur in these two conditions. Experience convinces me that there is still considerable misunderstanding regarding optic neuritis and papilledema. In fact, the entire nomenclature of optic nerve affections is quite confusing. Although optic neuritis and papilledema in its incipiency cannot always be sharply separated it is now a generally accepted view that optic neuritis or papillitis, as it is frequently called, is an inflammatory lesion, either extending to the nerve head from within the skull, the "descending neuritis" of von Graefe, or from the retina, the so-called "ascending neuritis," a condition known as neuro-retinitis, while papilledema is the result of a mechanical pressure within the cranium.

Inflammation transmitted by continuity through the nerve may occur at any part of the course of the nerve but is recognizable with the ophthalmoscope only when it reaches the termination of the nerve in the eye (the papilla). The nerve head or optic disc then appears gray or reddish gray and slightly swollen, though not enough to raise it perceptibly above the level of the retina. The discoloration and swelling extends beyond the confines of the papilla into the adjacent retina and gradually fades, thus obliterating the outlines of the disc. This is an optic neuritis or papillitis and the picture is quite contrary to that of a neuro-retinitis as it occurs in nephritis or diabetes, in which there is a diffuse and extensive retinal involvement coincident with the papillitis. Inflammation in the course of the nerve and not involving the nerve head, and hence not recognizable with the ophthalmoscope, is spoken of as retro-bulbar neuritis.

Differentiation between a physiological and pathological nerve head is not always easy. Some nerves are normally somewhat indistinct in their outline and have a grayish color. Such cases are referred to as pseudo-neuritis. Then in certain eyes with high degrees of astigmatism, the optic nerve at first glance appears blurred. It is easy for those less experienced in the use of the ophthalmoscope to mistake such cases for the blur of an optic neuritis.

Papilledema, or the so-called "choked disc" is not, as Leber and his school formerly taught, an advanced stage of optic neuritis, but is now generally looked upon as a non-inflammatory process or a visible expression of edema of the nerve. Von Graefe[1] was the first to associate it with increase in intra-cranial pressure. He advanced the theory that the increase in intracranial pressure led to compression of the cavernous sinus and engorgement in the ophthalmic vein. Based upon Schwalbe's[2] anatomical discovery that the intravaginal lymph sheath of the optic nerve and the sub-arachnoid spaces of the brain communicate, Schmitt-Rimpler[3] later propounded the hypothesis that by virtue of a general increase in intracranial pressure or by direct pressure on the aqueduct of Sylvius the sheath of the optic nerve becomes distended by an accumulation of fluid (hydrops of the vaginal sheath) and as a result of compression of the central vessels of the nerve, a venous engorgement with secondary edema of the nerve head takes place. Experimental study of Cushing, Bordley[4] and others seems to uphold this theory.

Papilledema, which has also been designated as a congestive neuritis, when fully developed gives the nerve a characteristic ophthalmoscopic appearance. The classical developed papilledema is characterized by a uniform advancement of the papilla of from two to five diopters with the vessels turning sharply at its edges. The distended tortuous veins often appear interrupted in their course through the swollen retina adjacent to the disc. The arteries appear unusually narrow. At times there are serous and hemorrhagic effusions in the retina. In the later stages of papilledema when the infiltration becomes extensive, inflammatory changes may prevail and bring about retinal changes around the macula identical to the macular figures characteristic of albuminuric retinitis.

A few years ago I saw a case of this kind for Dr. Sherrill of Louisville, in a middle-aged woman who

had been suffering with headaches, vertigo and vomiting. She had blurred discs with no measurable swelling and exhibited the stellate formation of spots around the macula. As the patient had an albuminuria with hyaline and granular casts I looked upon the ophthalmoscopic changes as secondary to the renal condition and advised against cranial surgery. It subsequently developed that the woman had a brain cyst. I do not recall whether this was determined by operation or post-mortem.

Unfortunately many cases have been allowed to reach the stage of a typical papilledema before treatment is instituted, but with the increasing knowledge in ophthalmoscopic and neurological diagnosis and the advance made in neuro-surgery cases are now being brought to light earlier and through prompt treatment are rewarded with more favorable results. The presence of either optic neuritis or papilledema is always indicative of a serious condition and demands an immediate effort on the part of the ophthalmologist to determine the underlying cause.

A differentiation between optic neuritis and papilledema in the early stage is often not possible from the ophthalmoscopic picture alone, and the cooperative efforts of the internist, the neurologist, the surgeon, and the ophthalmologist may often be required to accomplish this. We should not temporize in any case which shows changes of the optic nerve, for the early interpretations of the cause of such changes will not only enhance the prospect of curing the underlying condition but will lessen the probability of a permanent amblyopia. One of the early signs of an impending papilledema is a partial or complete obliteration of the physiological cup or funnel. Schreck[5] has observed by stereoscopic examination with the Gulstrand lamp that this early encroachment on the hilus of the nerve is the result of an edema around the central blood vessels. This symptom may occur before any other sign of papilledema has become manifest. It may be associated with a slight elevation of the disc, especially on the nasal side, and with engorgement of the retinal veins. It must be borne in mind that the ophthalmoscopic picture is but one of many signs of intra-cranial pressure.

The functional examination is of undoubted value as an aid to diagnosis. Loss of vision usually comes on more rapidly in optic neuritis than in papilledema. However, disturbance of central vision is an uncertain quantity, especially in the early stages. Hence our increasing knowledge of visual field defects determined by perimetric measurements, has in recent years been of much service in differentiating between optic nerve affections and in clearing up their etiological diagnoses. A study of the visual field should be made in every case of suspected intracranial disease.

In optic neuritis the confines of the visual fields are often constricted. Even though there be no measurable swelling of the disc an enlargement of the physiological blind spot of a varying degree can nearly always be demonstrated (this is contrary to the findings in retro-bulbar neuritis in which a central scotoma is usually present).

Papilledema may be associated with considerable disturbance of central vision although it is not unusual for the swollen disc to prevail over the period of weeks or even months and to be quite pronounced without interfering perceptibly with central vision. It might be of interest to note that, conversely, cases with only slight changes in the disc are associated with marked functional disturbance. The visual field is usually concentrically constricted, especially for colors, and varies in degree with the amount of edema of the disc. The physiological blind spot is nearly always enlarged, the degree also varying with the amount of edema, although generally the enlargement is not so pronounced as it is in optic neuritis. As it has been demonstrated that the optic disc may be odematous with little or no visible changes in the ophthalmoscopic picture, lumbar puncture should be considered in cases of suspected intra-cranial disease and the fluid pressure studied with the spinal mercurial manometer. The general neurological picture, such as headache, slow pulse and vomiting, must necessarily be taken in account in arriving at a differentiation between optic neuritis and papilledema.

Optic neuritis usually manifests itself bilaterally but occurs unilaterally with much greater frequency than papilledema. It is most frequently brought about by an extension of the inflammatory process of the meninges, especially at the base, and hence is observed in meningitis of otitic origin and in leutic and tuberculous infections of the cerebral membrane. Swelling of the disc in simple meningitis is very rare and occurs in the late stages, the result of an internal hydrocephalus. Lues is a rather frequent cause of optic nerve inflammation, involving the nerve primarily as part of a neuro-retinitis or indirectly by extension of the syphilitic processes from the orbit or cranial cavity. The inflammation is believed to result from the local action of the toxins of spirochetes.

Optic neuritis is also observed, though with great rarity, as an accompaniment of acute in-

fectious diseases, as measles, scarlet fever, pneumonia, typhoid fever, and encephalitis lethargica. We know today that it results not altogether infrequently from focal infections in the teeth, and tonsils. Poisoning produced by lead, and alcohol, are known to cause inflammations of the nerve. In this connection may I be permitted to say that the cases of optic neuritis which followed the use of arsenical preparations are now ascribed to the liberation of spirochetes and it is believed that the neuritis can be avoided by anticipating the arsenical treatment with the administration of mercury or by giving it coincidently with the treatment. Rarely optic neuritis is observed in perforating wounds of the skull, in hydrocephalus, oxycephalis, (tower skull) and in disseminated sclerosis.

Optic neuritis extends over a period of several months. As the inflammation of the nerve head subsides, atrophy with permanent disturbance of function usually supervenes, the degree of atrophy and amblyopia depending on the severity and duration of the neuritis. It is not unusual for the mild types to be followed by complete resolution without permanent loss of function. In the presence of optic neuritis, and especially if its cause is obscure, it must be borne in mind that an inflammatory condition of the nerve may be a forerunner of a congestive papilledema, which may assert itself after days or weeks in the advanced optic disc. It is also believed by some that in cases of marked edema metabolic changes take place and eventually bring about a secondary neuritis.

Ordinarily papilledema develops without a preceding neuritis. If it remains unilateral for some time the assumption that its cause resides in the orbit of the affected side would be justifiable. However, unilateral papilledema has exceptionally been observed in brain tumor, brain abscess, multiple sclerosis, lues and in other affections which usually involve both nerves. Anything that will encroach on the intra-cranial space may cause papilledema. Hence the appearance of papilledema in both eyes at once suggests that we are dealing with a serious case.

As from 70 to 80 per cent of all bilateral cases of choked disc are due to intra-cranial growths and as all but from five to ten per cent of intra-cranial neoplasms manifest themselves in a swollen nerve, the presence of papilledema would naturally suggest at once the existence of a brain tumor, such as glioma, sarcoma, gumma, tuberculoma, or a cyst. Tumors cause edema of the nerve, either by their mechanical presence as in the case of large growths or by blockage of the ventricles with secondary internal hydrocephalus. This explains the observation that the size of the tumor has no bearing on the severity of the nerve changes or in other words, that small tumors are frequently associated with a pronounced optic nerve change, whereas tumors of considerable size may occur without involving the nerve. The absence of papilledema in a certain number of brain tumors has been explained in that the neoplasm in such cases compresses a large cerebral artery and causes extensive secondary softening.

The site of the tumor, seems to influence the frequency and severity of optic nerve changes very much more than its size. Basilar tumors, those of the frontal lobe and of the hypophysis, are seldom associated with edema of the nerve, the communicating orifice of the intra-vaginal space into the cranial cavity being blocked by direct pressure, while on the other hand new growths of the cerebellum are very prone to cause papilledema. Owing to the unyielding tentorium the pressure in cerebellar growths is exerted on the aqueduct of Sylvius and the cerebrospinal fluid is forced forward. The contention of Horsley that papilledema appears first and is most severe in the eye which is homolateral to the tumor is usually true but as the contrary relations may prevail this feature is of but slight moment as an aid in localizing the site of the pathology.

These observations impress the uncertainty of the incidence of optic nerve changes in brain tumors, for it is evident that this symptom is of value only in a positive way and when present is but one of a chain of symptoms indicating intra-cranial neoplasms. In discussing this subject before the Baltimore Ophthalmological Society, Dec. 3, 1925, Dr. Walter Dandy said that "the more we learn about the diagnosis and treatment of brain tumors the more capricious and uncertain does the incidence of choked disc seem." He has come to regard papilledema as pathognomonic of nothing and feels that its presence is merely to be taken as a single link in a long chain of clinical evidence.

Notwithstanding the frequent incidence of papilledema in brain tumor we must bear in mind that all cases of papilledema are not brought about by intra-cranial growths. Of the remaining or infrequent causes, it has been estimated that lues represents 10 per cent; tuberculosis, 5 per cent; and brain abscess 3 to 4 per cent; the remaining 3 to 4 per cent being divided between meningitis, hemorrhages at the base, thrombosis of the cavernous sinuses, internal hydrocephalus,

pachymeningitis, encephalitis lethargica, focal infection, anemia, leukemia, suppressed menses, and similar conditions.

Papilledema of syphilis, which usually occurs in the presence of gummata is not due to direct involvement of the nerve as in optic neuritis, but to an increase in intra-cranial pressure. I am convinced that lues does not account for papilledema so frequently as statistics seem to indicate and that the exaggerated figures are due to the fact that many cases of optic neuritis have erroneously been recorded as papilledema. The same is no doubt true of tuberculosis, abscess and other conditions associated with papilledema.

Abscess of the brain, owing to its slow development and the breaking down and replacement of brain substance, does not lead to increased intra-cranial pressure as frequently as one would expect, and hence is not frequently associated with nerve changes. That this view is not universal is evidenced in the statement of Leon E. White[6] that nerve changes are present in 58 per cent of cerebellar abscess and 60 per cent of tempero-sphenoidal cases. Papilledema does prevail in cases of brain abscess whenever the edema of the brain is sufficient to bring about secondary increase in intra-cranial pressure, or blockage of the ventricles.

Fractures of the base of the skull are sometimes, though rarely, associated with a papilledema, as the rapid increase in intra-cranial pressure usually affects the respiratory and vasomotor centers and death ensues before edema of the nerve can develop. While most surgeons attribute the papilledema in these cases to the increase in intra-cranial pressure secondary to the mechanical presence of blood within the cranium Loeb[7] and others do not believe that it is the result of increased intra-cranial pressure, but to penetration of blood into the optic nerve sheath. The slow forming extra-dural type of hemorrhage often leads to nerve changes.

There has been considerable discussion regarding the occurrence of papilledema in nasal accessory sinus disease and it is now generally believed that when papilledema occurs in sinus disease it is due to a coincident intra-cranial lesion, and that the incidence of papilledema in nasal accessory sinus disease has been exaggerated. Relative to this question Bordley[8] says:

"It has been my privilege to see nasal sinus disease complicated by choked disc but in every instance where the cranial contents were viewed, before or after death, there existed unmistakable evidence of an intra-cranial complication."

There are certain conditions associated with papilledema which Horrax of Boston terms "tumor equivalent" in which a decompression operation is indicated just as it is in intra-cranial tumors, such as serious meningitis, oxycephalus, pachymeningitis hemorrhagica interna. Such cases are quite rare. The most frequent of them is chronic or subacute cisternal arachnoiditis, or as it is usually called, serous meningitis. It is believed to be a cerebral affection allied to poliomyelitis and that it produces a thickening of the arachnoid and a blocking of the channels of exit from the third and fourth ventricle, thus similating brain tumor. It is rapid in its onset and there is often markedly early disturbance of vision. The nerve changes come on late in these cases. They terminate in spontaneous cure but as they run a protracted course nerve atrophy and blindness of a varying degree may result unless a decompression operation is done early.

An interesting case in which a diagnosis was not made but which evidently should have come under this category came under my observation in September, 1918:

A medical student, aged twenty-seven years, was led into my office by two of his class-mates. He gave the history that he had, a week previously, suddenly lost the vision of both eyes. He had no other symptoms of brain tumor, such as headache, or nausea. Examination showed that he had wide pupils with slow reaction to light. The media were clear but both optic nerve heads were raised about four dropters. The edges of the discs were erased, blood vessels were tortuous and arteries small. Quite a few retinal hemorrhages were present. Central vision was so disturbed that he could count only fingers at one foot. Visual fields could not be accurately measured but it was evident that the fields were somewhat constricted. Enlargement of the blind spot could not be demonstrated. In the presence of bilateral papilledema with marked functional disturbance an immediate decompression operation was urged to keep down intra-cranial pressure until the cause of the papilledema could be determined and removed. Dr. Samuel Dabney kindly examined this case and concurred in the opinion that an immediate operation was indicated. A sub-temporal decompression was done by Dr. John Wathen. There was an immediate improvement and a week after the operation vision was 20-200 in each eye. This man made a rapid recovery and in six weeks all signs of edema of the nerve had disappeared and vision had returned to normal. The man never developed other symptoms. The last time I saw him, about a year ago, central and peripheric vision was normal and the eyes showed no abnormality.

Papilledema occasionally seen in polio-encephalitis and in encephalitis lethargica is brought about in the same way. In such cases the papilledema develops very rapidly and the spinal fluid is usually under high pressure.

I have recently seen two cases of papilledema

occurring in encephalitis lethargica, which I shall report in abstract merely to illustrate the incidence of papilledema.

The first of these occurred in a man of fifty-two years, seen with Dr. Morris Flexner. The symptoms in this case were quite obscure and the diagnosis of encephalitis lethargica was made only after studying the case for ten to fifteen days. After two weeks of constant headache and a week of disturbed vision, which could be attributed to muscle imbalance and consequent diplopia, choked disc developed very suddenly in one year, practically in forty-eight hours, and from thirty-six to forty-eight hours later in the other eye. As this case terminated fatally further ocular observations could not be made. Post-mortem diagnosis of encephalitis was made by Dr. Stuart Graves, Professor of Pathology, University of Louisville. The interesting feature was the occurrence of a choked disc in encephalitis lethargica, a disease in which the nerve is but rarely involved, and the suddenness of the onset of the nerve edema, indicating sudden pressure on the ventricles.

The other case occurred in a woman of thirty-seven years, whose first symptoms were diplopia. She had been seeing double for three weeks when I saw her on Sept. 8, 1925, and had suffered considerable nausea and pain in the occiput and over the left eye. She did not exhibit a tendency to sleep but had lost all energy and ambition. She had noticed a lapse of memory for recent occurrences. Examination showed little or no defect in central vision: right 20-30; left 20-20. The visual fields were somewhat constricted in a concentric way and both physiological blind spots were considerably enlarged. There was a spontaneous homonymous diplopia of twenty degrees, due to paresis of both external recti muscles. Ophthalmoscopic examination revealed pronounced papilledema with multiple hemorrhages and a few white spots about both maculae. The case was referred to Dr. Wallace Frank for diagnosis with the suggestion that a decompression operation seemed indicated to preserve the vision. This was done with a most gratifying result. Three months after the operation the extrinsic muscles had returned to normal and there was no diplopia. The optic nerves were still somewhat hazy. Vision had returned to 20-20. On Feb. 18, 1926, five months after the operation, both eyes were normal and vision perfect, 20-15, with normal visual fields.

Papilledema usually runs a slow course and unless the cause is removed early terminates in atrophy of the nerve and blindness. Such an outcome is to be expected, especially where the papilledema has advanced to the stage of retinal effusions and hemorrhages. The feature of greatest importance to the oculist in the treatment of these cases is the influence on the eventual function of the eye. We know now that a sub-temporal decompression operation as it was first described by Cushing[9] if performed in the earlier stages of papilledema will almost certainly prevent blindness as the nerve changes retrogress rapidly after such operation. Even if done in the late stage it may preserve some vision provided the intra-cranial pressure can be relieved. As the palliative decompression operation is a comparatively safe procedure as regards life, and as it offers no menace to sight, it is advisable in all cases of papilledema to relieve pressure while awaiting localizing symptoms and otherwise investigating its cause and instituting treatment. The operation is of especial value in papilledema of syphilis. In these cases early intensive treatment may bring about complete restoration of function, provided intra-cranial pressure is reduced during the treatment.

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DISCUSSION (*Abstract*)

Dr. E. C. Ellett, Memphis, Tenn.—The difference both as to nature and cause between papilledema and optic neuritis is best appreciated by remembering that one is an edema, probably mechanical and the other a true inflammation. The old method of classifying as "choked disc" or papilledema, those cases where the swelling is 3 diopters or more, is not very scientific but is very practical. While papilledema is the great ocular sign of increased intra-cranial pressure, it is seen in other conditions as well, such as sinus disease, and also in that form of disseminated choroiditis where the lesion lies next to the nerve head, the so-called chorio-retinitis juxta-papillaris. A very recent case seen in the beginning showed marked edema of the nerve, but was in no possible way to be confused with the type referred to in the paper. The visual fields in papilledema, are to say the least, not characteristic, and depend largely on the location as well as the size of the lesion causing the increase of intra-cranial pressure. The field may be normal; or contracted, as in lesions remote from the visual pathway; it may show homonymous defects, as in temporal lobe tumors; and there may be many other varieties of abnormal fields. In both papilledema and optic neuritis, we may have a contracted field and an enlarged blind spot.

The constant appearance of the central scotoma in retro-bulbar neuritis should suggest how easy it would be in either of these conditions for changes to occur in the nerve that would lead to the development of a central scotoma. It has never seemed to me quite reasonable to pin too much faith in visual fields, unless the changes are well marked and constant. Not only patience, but a degree of concentration and intelligence on the part of both the observed and the observer, that is not always present, is necessary to elicit signs to which much importance is sometimes attached. Central scotomata are easily detected, but moderate contractions of the field, enlarged blind spots, and other features considered significant, are by no means so certain. The objective things one can see are more to be trusted than what a sick man tells you he sees.

Papilledema connotes increased intracranial pressure from one of a large variety of causes, while optic neuritis points more to an inflammatory cause. In either

case, a careful general physical, neurological and laboratory examination, with especial care directed to the usual sites of foci of infection and the examination of the blood and kidneys will often keep us from error.

In the order of their frequency, optic neuritis should be thought of as due to syphilis, tuberculosis, nephritis and diabetes, arterio-sclerosis and middle ear disease. Papilledema suggests first brain tumor, then meningitis, hydrocephalus internus and cavernous sinus thrombosis. If either affection is unilateral, a local cause, as orbital or sinus disease should be carefully considered.

Dr. M. M. Cullom, Nashville, Tenn.—I agree with Dr. Pfingst in his statement that the appearance of the optic nerve and the fundus is sometimes confusing, especially to inexperienced ophthalmologists. I remember when I was in the Manhattan there were two men studying ophthalmology. I showed them an embolus of the central artery one day and explained the blanched field and the cherry red spot, and every day for a week after they came to me in great excitement to show me an embolus of the central artery that they thought they had found. But it is not always the inexperienced man who is puzzled.

The diagnosis of these cases can often be made from the other general symptoms. In cases of papilledema we have other symptoms of cranial pressure such as headache, vomiting, slow pulse and often focal symptoms. We have there the appearance of an edema, while in neuroretinitis we have the appearance of inflammation. In neuroretinitis we generally have hemorrhage, diminution of vision, and exudates, while in papilledema we can have a swollen nerve head of five or six diopters without the least intereference with vision. Interference with vision and hemorrhage are usually late symptoms.

As to the clinical significance of neuroretinitis and papilledema I do not think anything has changed more than our attitude toward these conditions. Formerly a case of neuroretinitis was put on mixed treatment, hoping it would do some good. Now we go into the history, we search for foci of infection in every part of the body, and we do something for our patient.

I would like to mention something that interests me, and that is encephalitis. Previous to this year I had thought that papilledema was not associated with encephalitis, but some time last spring I saw a case of encephalitis with Dr. Haggard that had a most marked papilledema. I advised decompression in order to save the man's sight and it was done. His symptoms improved greatly for a few weeks and he was able to return to his home in Oklahoma, but in two months he died. I do not know whether an autopsy was done or not.

Dr. John O. McReynolds, Dallas, Texas.—One of my colleagues, in a very large clinic, is being sued for $50,000 damages for alleged loss of the sight of both eyes from optic neuritis. The case illustrates the variability in the amount of vision present, and the extreme rapidity with which the trouble may sometimes advance even during an investigation and before beginning treatment. The patient gave a negative history except for pain, which lasted while she was in the hospital and entirely disappeared when she left the hospital. She was almost blind at the time she entered the hospital. It is extremely important to recognize the conditions rather promptly, and we need not delay two to four days in arriving at a tentative diagnosis to the effect that the patient has a serious optic nerve affection. The patient should be apprised of this fact so that she and her friends and the medical profession in touch with the case can understand that the patient is in a serious condition. This patient claims that she was able to see, and evidently she had intervals during the first two or three or four days in the hospital when she did see, but by the time she was leaving the hospital she was practically blind, and now has a genuine well-marked atrophy following the choked disc.

In the nerve head there are so many different types of physiological excavation that this must be taken into consideration in estimating the amount of elevation of the nerve head that would mean an actual pathological state.

Dr. Alan C. Woods, Baltimore, Md.—We agree with Dr. Pfingst in his plea for some clearing up of the nomenclature. The literature is confusing and it is very difficult to tell what condition a man is describing.

In only a small number of cases of elevation of the optic nerves does the ophthalmological examination itself clearly indicate the etiological factor, either an inflammatory process in the nerves, a papillitis, or increased intracranial pressure, choked disc. In a majority of cases where we are not sure from the ophthalmoscopic appearance, we believe it wiser to confine ourselves to the statement that it is an elevation of the optic nerve, and that further study will be needed to show whether it is a case of choked disc from increased intracranial pressure or a case of optic neuritis, due to inflammation.

One point in the paper that should be dwelt on is the danger of lumbar puncture in these cases of papilledema. Occasionally a sudden death occurs following such a lumbar puncture. The reason is that the sudden relief of pressure causes a sudden dropping of the brain stem in the foramen magnum. In many clinics, lumbar puncture to determine increase of intracranial pressure has been almost entirely abandoned.

The last point that impressed me in the paper is the advice we should give to patients as regards decompression. It must be realized that after all a decompression is only a palliative procedure, and that intracranial surgery has made enormous advances, such as air injection of the ventricles. Early diagnosis and operation are now possible where they were impossible before. The mortality following operation is growing less. While in the early days of brain surgery the mortality was around 80 per cent, it has now fallen to less than 25 per cent. The earlier the operation is performed, the greater are the chances of real cure of the patient. Many of these cases of brain tumor are seen first by the ophthalmologist. It seems to me a very much wiser procedure to advise them to take their chance for a real cure with more radical intra-cranial surgery.

Dr. W. G. Kennon, Nashville, Tenn.—Dr. Pfingst did not mention the edema of the nerve which occurs following circulatory disturbance such as may happen after ligation of the jugular vein, and as I recently had such a case I would like to ask him one question about it. That is, where you have this marked edema and marked swelling without any disturbance at all apparently of the acuity of vision, and without any demonstrable disturbance of the field of vision, and in which there was no other indication for surgical interference, does the edema *per se* do any damage?

Dr. Joseph D. Heitger, Louisville, Ky.—Very frequently in our routine refraction work we are likely to pass over certain changes around the nerve head,

and only when cases are referred to us for examination of the fundus do we stop and examine a little more carefully. The work of Magitot and Braillard has resulted in the making of an instrument known as a dynamometer, which can be of great assistance to us, and which works in a similar way to the use of the tonometer, and which can apparently be acquired with as much ease. We all know that when a glaucoma reaches a certain stage the arteries will begin to pulsate. Working on that principle Magitot and Braillard after a number of inventions, found that the relation existing between the diastolic pressure and the retinal arteries was greatest when pressure was increased. With this instrument they found the relation to normal blood pressure was 1 to 0.45, and in high blood pressure, 1 to 0.50. They also found that with the average normal with this instrument it requires 35 millimeters to produce pulsation in the retinal arteries. This they have taken as their normal. Let us say that the tracheal diastolic pressure is 80 mm., and with this dynamometer they find the pressure necessary to produce a pulsation of the retinal artery would be 55. They are in agreement as to its being associated with increased intracranial pressure. The instrument can now be procured, and is used by pressing against the eyeball and observing the retinal arteries with the ophthalmoscope. This instrument would also be valuable in the cases which Dr. McReynolds has mentioned, where there is a difference around the nerve head in various patients; it would enable us to diagnose these cases in the early stage of the development of papilledema, and we could get these patients under proper neurological treatment with advantage to the patient and to ourselves.

Dr. Rufus Jackson, Baton Rouge, La.—I would like to speak for a few minutes of the phase of optic nerve affection which is of such low grade as to be almost imperceptible.

Cases have come to my attention in my connection with the Blind Institute at Baton Rouge, in which I have never been able to make out more than a small blurring to the nasal side of the nerve. A boy about eight years of age had a low grade compound myopia. His vision could not be raised above 20-40, subsequently did rise to 20-20, and yet all I could find was a blurring of the nasal borders of the nerve. The next case was that of a woman, who gave a history of having had impaired vision for seven years. She had not been observed and I could not corroborate this. She was in the early thirties, and although her vision was only about 20-50, after the removal of the cause the vision was 20-20. A little girl in the Blind Institute had a vision of only 20-200, but by the removal of the cause her vision is now 20-30. The removal of focal infection in each of these cases, either teeth or tonsils, has caused improvement in vision. In all cases at the Blind Institute that show this lesion we first have the tonsils removed.

Dr. Pfingst (closing).—No one has done so much to stimulate us in doing visual field measurements and aiding in the diagnosis of intracranial disease as the neurosurgeon. The pioneer work of Cushing and Fraser was the original stimulus to the betterment of diagnostic methods. Fortunately, most of the larger medical centers now have disciples of one or the other of these pioneers. Like Dr. Wood I would not assume the responsibility of a lumbar puncture, or a decompression, as long as we have the neurosurgeon in consultation who can pass on the advisability of these procedures.

While most of us have been doing more and better visual field measurements than formerly, and are realizing the importance of this diagnostic method, I believe there is a great field open to us in the way of missionary work among general practioners, regarding the significance of severe headache and its association with intra-cranial affections and as regards life and the preservation of vision.

We have all seen cases of intra-cranial disease with marked symptoms which have been allowed to reach such advanced stages that by the time they were seen by the surgeon operation offered little hope for life and less for ultimate vision. Just a few days ago I saw a case that had been having severe headaches for five and six months. When brought in for ophthalmological examination a receding papilledema was found with practically no vision. Naturally the case at this stage offered little hope of relief.

The review of such cases before county and district societies with a view of emphasizing the means at our disposal of making earlier diagnoses will lend much to lessen the mortality rate in intracranial surgery and incidentally to preserve visual function in the cases successfully operated upon.

PEDIATRIC CLINICS IN ALABAMA—AN EXTENSION COURSE*†

By A. A. Weech, M.D.,
Baltimore, Md.

Education, medical or otherwise, which ceases to advance after its recipient has acquired a diploma, is doomed to stagnation and eventual decline. The physician removed from the progressive and critical atmosphere of the medical center in which he acquired his professional knowledge and settled in a rural town far removed from libraries, clinics, and opportunities for interchange of thought is in a precarious position. To be sure he will learn much that no school could have given him: to understand and treat people as human beings rather than as cases and to depend on his own resourcefulness. But with the opportunity gone for keeping abreast with the advancement of his profession and lacking the stimulus brought by men whose opinions differ from his own, he is destined to become a victim of daily routine and to lose the breadth of outlook so essential to a professional man. Books and medical journals, when time is alloted for their perusal, can work miracles in preventing his decline but too often it is the attractively worded advertisement of some proprietary nostrum which is read by pref-

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†From the Alabama State Board of Health.

erence. The local medical society where the physicians of a town or county can meet and discuss their problems together cannot be commended too highly. Here good fellowship is promoted and problems of special local importance are clarified by open discussion. It is unfortunate that competition so often leads to personal grievances and professional jealousy that medical society meetings become impossible. The majority of practicing physicians of this country do not attend any medical society. Sir William Osler advocated the "perennial brain dusting," the allotment of a time when each physician would leave the town of his practice and go for a sojourn in one or more of the large medical centers. The extension course plan in medicine has developed logically in recognition of the need of providing even greater safeguards against the decline of acquired knowledge. Under this plan is included any movement primarily educational in which the class-room, clinic or laboratory is taken to the pupil instead of the pupil's moving to the school. The limitations of equipment are evident; the great virtue is accessibility. Although properly most extension courses have been relegated to the domain of the state universities it is of interest to us here today that the first medical experiment in this field of education was promulgated in 1916 by the State Health Officer of North Carolina, Dr. W. S. Rankin.

In Alabama the plan was first suggested at a meeting of the State Medical Association in 1923 when the president, Dr. W. W. Harper, presented definite recommendations for establishing postgraduate clinics throughout the state, but the work was not undertaken immediately. In 1925 definite plans were formulated by the State Board of Health for a group of summer pediatric clinics. The clinics were to deal with problems of diagnosis and therapy in infants and children of pre-school age and with satisfactory and simple methods of infant feeding. They were designed primarily for the physicians of the state without attempt to reach the lay population. According to the plan the clinics were conducted during the summer of 1925 and again in 1926. The thought that many of the problems encountered were general ones and the solutions reached of interest to those who contemplate the organization of similar projects is the justification of the present paper.

In formulating plans for the contemplated clinics the originators of the idea wisely recognized that whatever type of course or clinic was undertaken the hearty indorsement of the local physicians would be essential to its success. It was also felt that to secure this endorsement the main responsibility for the support of the clinics would have to be placed on the physicians themselves. With this end in view the proposition was placed before the county medical societies in a selected number of counties and a decision to take the clinics into their territory reached only after a direct invitation from the county medical societies had been extended. The plan was to have the clinic remain in each county for one week, and, as the time available for the work was limited to thirteen weeks, the first thirteen counties to extend an invitation were to be chosen.

The counties before whose medical societies the proposition was placed were those in which the State Board of Health assisted in maintaining a local health unit. At the time 28 of Alabama's 67 counties were so organized. Each health unit consisted of a county health officer who was assisted by a nurse, a sanitary inspector, and a stenographer. By undertaking to hold the clinics only in counties so organized the local health units were available for advance preparation and for active assistance during the clinic week.

EQUIPMENT

The selection of the various points throughout each county for holding the clinics was left to the county health officer. In every case the clinic group selected some centrally located town, usually the county seat, as a temporary home and moved out each day to the various clinic sites. In some counties all of the clinics were held in one place. More often different towns throughout the county were chosen so as to bring the clinics as close as possible to the greatest number of physicians. It is not possible to say that one of these methods is better than the other, as variations in local conditions must be met. Thus occasionally nearly all of the physicians of a county live in a centrally located town or can readily reach this town. However, experience did show that when all of the clinics were to be held in one place it was the part of wisdom not to prolong the clinic hours through the entire day but to conduct them only from 8:30 or 9:00 A.M. until 1:00 P.M. Very often the same physicians wished to attend all of the clinics and, as their practices could not be neglected, it proved advisable to leave a portion of each day open. On the other hand when each day saw the clinic in a new locality it was often possible to keep open all day with profit.

The choice of rooms suitable for the needs of

the clinic was felt to be of considerable importance but was often narrowed by the limitations of the town to be visited. It did prove necessary, however, to have two rooms available, one to be used for examining the patients and seating the visiting physicians, the other as a place where mothers with children to be examined might wait, and where the patients might be undressed and weighed, and histories taken. Obviously it was desirable that the examining room be well lighted and ventilated. The furniture was never elaborate. It consisted of chairs for seating the physicians, a small writing table for the use of the stenographer and an examining table. For this last purpose almost any table of sufficient size could be adapted. Frequently one of the folding metal tables used in physicians' offices for examinations and minor operations was available. Rooms in a variety of different places were found to furnish these requirements, the school house, the court house, offices of the county health department, the hospital and offices of various local physicians. Before making use of a physician's private office it was always well to ascertain the attitude of the other physicians in the locality, as frequently local antagonistic professional feelings existed, which might have led to a feeling of resentment toward the clinic, had the offices of one of them been selected.

The supplies used in conducting the clinic were not elaborate. Every effort was made to use material which might be locally available, and the amount of baggage to be transported reduced to a minimum. The local health units were asked to provide paper napkins, tongue depressors, soap, towels, wash basin, adhesive, a few bandages, several antiseptic solutions (alcohol, iodin, and hydrogen peroxid), absorbent cotton, safety pins, a yard stick or tape to be fixed to the wall for measuring the height of children, and a heavy blanket suitable for use as a mattress over the hard examining tables. Two kinds of scales were necessary, for infants and older children. In most of the counties visited these were part of the equipment of the local health bureaus. Occasionally it was necessary to ship the infant scales from the state office. The county medical societies were asked to provide a microscope, so that there might be no delay in making a few simple examinations. The clinic group carried with them a piece of rubber sheeting and clean linen for covering the examining table, half a dozen small cotton sheets for wrapping about children undressed preparatory to being examined, and several clean gowns for the pediatrician's wear. The physician conducting the clinic brought with him a stethoscope, a steel tape, flash light, reflex hammer, combination otoscope and ophthalmoscope, blood counting chamber, a Talquist hemoglobin scale, a few accessories for demonstration purposes (apparatus used in artificial feeding of infants, cuffs to prevent thumb sucking, rumination cap, apparatus for administration of intraperitoneal salt solution, and a binder used to assist in collecting urine from infants). All of the materials not locally provided could be contained in a single suit-case and were thus transported from place to place.

PERSONNEL

During both summers the pediatrician was accompanied by a secretary who was trained not only to care for the clinic records but to assist with numerous incidental details. In addition during the first summer (1925) the group was assisted by one of the supervisory nurses from the Bureau of Public Health Nursing. This nurse, being familiar with the public health work throughout the state, was especially valuable in acquainting both health officers and local physicians with the purposes of the clinic. While with the group she acted as general manager of details in suggesting the most desirable rooms to be used, in assisting physicians in the selection of cases for presentation, in arranging the clinic room in a neat and professional manner and lastly in taking histories of patients prior to their coming before the clinic. During the summer of 1926 the work previously done by this nurse was divided between the secretary and local public health nurse.

THE LOCAL PHYSICIANS

At the outset it became apparent that the clinics would not fail because of lack of clinical material and that the problem was to maintain the interest and cooperation of the local physicians. As, in the rush of daily routine, the average physician was liable to overlook the time appointed for the clinic, it was the duty of the county health officer to see that notice of the coming clinic reached each physician in his territory during the preceding week and that on the first day a further reminder in the form of a personal telephone call was issued. The president of the county medical society was also asked to cooperate in getting the physicians together and often proved of invaluable assistance to the county health officer. In several instances individual physicians were eager to assist in making their first trial clinic a success and

entered with enthusiasm into the work of improving attendance, providing clinical material, and participating in discussions. It is of course merely a platitude to say that the clinics were successful in proportion to the amount of support they received from the local physicians. The writer feels that the best results in teaching were obtained when eight or ten physicians were present. As a rule only half this number were in attendance. On half a dozen occasions an attendance of more than twenty physicians was reached. Although such a hearty response is very gratifying it is difficult to demonstrate the important features in a physical examination to such a large group, especially when the demonstration requires palpation and auscultation.

CLINIC MATERIAL

In providing proper cases to be brought before the clinic the cooperation of the physicians was absolutely necessary from two standpoints: (1) in requesting suitable patients from their practices to attend (2) in politely but firmly declining to have present at the clinic essentially normal children whom their parents brought for a thorough physical examination. It was necessary to keep in mind constantly that the clinics were primarily a physician's affair as at times their effectiveness was quite annulled by a large influx of spoiled but otherwise normal children. In numerous cases children brought to the clinic at the parents' instance alone were turned away, but when the physicians, failing to enter fully into the spirit of the work requested the examination of such children (obviously in an effort to impress the parents with their interest in the children's welfare or because of unwillingness to refuse a request for examination), it proved difficult to eliminate them. This difficulty was less of a problem when care was taken to avoid newspaper publicity or any other form of advertisement which might reach the laity. On one occasion not a little embarrassment was caused by a colored preacher who spoke of the clinic from the pulpit and pictured the pediatrician to his congregation as a heaven-sent faith healer.

In general the physicians were told that two types of cases were desirable: (1) examples of unusual diseases presenting difficulties in diagnosis; (2) cases illustrating the common disorders which the physician has to treat every day. One might easily question the wisdom of showing rare and unusual diseases but it often proved that such cases stimulated the most thorough diagnostic discussions. Moreover, experience shows that the average physician is intensely interested by that which presents the elements of novelty. Interest once aroused is more easily maintained when one shifts the discussion to the important commonplaces. The ideal situation is to have both types of cases and to show them alternately. In one of the clinics a case of muscular dystrophy was followed by one of dysentery. Intense interest was manifested by the physicians in the first case which served to so stimulate the mental faculties that the later discussion centering about the diarrhea problem was entered into with enthusiasm.

TEACHING

A few words should be inserted concerning the methods of teaching employed as the writer was greatly interested in the most effective way of reaching a group of practicing physicians. In medical school teaching the interest of students can be maintained by quizzing and thereby forcing them to enter into active discussions of the material being presented. In talking to graduate physicians, especially where there is a certain amount of reserve due to the presence of fellow practitioners, such a method is not permissible. For this reason at the beginning of each day the physicians were told that the clinic was distinctly for them, and they were urged either to ask questions, to express opinions, or to give the group the benefit of observations from their own experience. In meeting the physicians privately before opening the clinic, it was the pediatrician's custom to urge each one to bring up the discussion of problems which he thought might be instructive to the group as a whole. The county health officers were often of great value in getting a discussion under way. Of great service from the pedagogic standpoint was the presence of the secretary, as the essential steps in making a complete routine examination were emphasized by dictation of either positive or negative findings as the various parts of the body were inspected. Although it was not customary to discuss the patient's ailments with the parent but rather to leave this to the physician who sent the child in, at the same time the presence of the mother was often a distinct aid to teaching and remarks could be made to her concerning the more general problems of child hygiene and habit training which might have seemed too elementary if addressed to a body of physicians. With each case the general routine was first to read the history, emphasizing the important points either directly or by asking the parent further questions, then to go on with the physical examination, dictating the

observations and giving the physicians opportunity personally to corroborate the important findings. Finally after excusing the patient, diagnosis, prognosis, and therapy were discussed. When interest was being manifested in the case at hand every effort was made to stimulate the discussions. When an attempt was made to hurry because of too abundant clinical material it was not possible to do satisfactory teaching. As a rule four or five patients for a half-day session proved to be an ample number. When more had been brought in it seemed advisable to send them away or to see them privately after the group had adjourned as a means of preventing ill-feeling on the part of the parents. As a rule the parents were quick to appreciate the difficulty of examining a large group of children and were willing to cooperate.

RECORDS

Although distinctly of secondary importance an effort was made to keep as accurate a record as possible of the history, physical findings, diagnosis and treatment with each case. It was obviously impossible from lack of time to incorporate even summaries of most of the interesting discussions that came up, but from time to time an outline of these was added in the form of a "comment." After some delay occasioned by attempting to use a card system for the records, the use of the ordinary 8x11 inch typewriter paper was decided upon as it was more easily handled in the typewriter than cards and as it allowed the making of carbon copies. At the close of each clinic a title sheet was prepared to go with each daily group of histories giving the date and place in which the clinic was held, comments upon the day's work as a whole, and a list of the physicians who attended. These histories with the title pages have been arranged in chronological order, bound in several volumes and placed on file in the office of the State Board of Health in Montgomery. I have brought two of these volumes here today and am having them passed around for your inspection. The carbon copies were left in the offices of the local county board of health and in some instances at the discretion of the health officers were again copied and mailed to the respective physicians. In preparing these histories the identification data and records of the family history, past history, and present illness were taken outside the clinic room either by the secretary before the opening of the clinic or by one of the nurses. The remaining part of the record was dictated to the secretary during the clinic. Later a typewritten record was prepared with everything complete except the diagnosis at the head of the sheet. After the finished history had been finally verified, the diagnosis was entered in the handwriting of the conductor of the clinic. In many instances kodak pictures were obtained of the more interesting cases and pasted to the completed records.

RESPONSE

In conclusion it may be said that the writer and all who participated in planning and conducting these clinics in pediatrics were gratified by the response of the medical profession. The project was undertaken more or less as an experiment. It was feared that many physicians might resent an attempt on the part of the State Board of Health to provide medical instruction. Occasionally such an attitude was encountered but invariably the physician who felt this way simply did not attend and the clinic was conducted satisfactorily in his absence. On the other hand many have expressed themselves by word and by letter as having found the clinics beneficial both because of the immediate instruction given and more because of an engendered desire to do more thorough work and to seek other opportunities of gaining a wider experience.

DISCUSSION (*Abstract*)

Dr. W. W. Harper, Selma, Ala.—I am familiar with the work which Dr. Weech did in Alabama. The seed he sowed there is still bearing fruit. The physicians who came under his influence have been taught the importance of stripping a patient and making a thorough physical examination; they have been taught the importance of examining every throat and the urine from each patient. By such examinations many cases of diphtheria have been detected that would never have been thought of and many cases of fever of obscure origin have been found to be due to pyelitis. He taught the importance of the early administration of antitoxin; the value of preventive medicine, the significance of abdominal pain and the importance of withholding purgatives until one could rule out an acute appendicitis or an intussusception.

His work was an inspiration not only to the physician but to mothers who were shown the value of consulting the physician and having a thorough examination of the baby rather than using self-medication. They were also taught the value of fresh air, sunlight and a balanced diet for their infants.

Dr. A. T. McCormack, Louisville, Ky.—The reason we as a profession are criticized, frequently, is that those who would feed us things that would improve us, present it in such a way that we are unable to digest it at all. If the instructor who is coming to us meets us on a common level there is no difficulty in teaching us anything that someone knows better than we do.

In the clinics we have been conducting since Dr. Weech talked to us, we tried to introduce at least

one apparently well baby into each half day of the clinic, to emphasize the importance of healthy posture, healthy diet, and health habits on the well child.

We have had a number of obstetrical clinics of this type. Two things I found difficult to remedy. A physician, if he is not a careful obstetrician, believes in pituitrin if he wants sleep. If we send him a letter from the State Association and then from the county health officer, it is of some profit.

Such education or clinics as are being conducted in Alabama make a model for us to build toward.

Dr. W. DeW. Hubbard, Florence, Ala.—I seem to be the only one here in whose county a clinic was held in Alabama last year. We certainly enjoyed having Dr. Weech with us. He did much toward getting the physicians to cooperate and become friendly.

Dr. John A. Ferrell, New York, N. Y.—May I ask the author the most practicable method for financing work of this character. My interest is not particularly related to compensation of the individual workers but rather the unit cost of production. It would be interesting to know also the sources from which funds should be obtained, particularly with reference to state and local government and, if they are to be supplied jointly, upon what basis. The plan in general seems to present possibilities for wide application.

Dr. S. W. Welch, Montgomery, Ala.—Dr. Harper, when president of our State Medical Association, recommended that the State Board of Health organize clinics of this nature. It was at that time impossible for us to do it. Finally, when we had a contribution from the Sheppard-Towner fund, we were able to finance the proposition through two summers. It had a marvelously beneficial effect in bringing the medical profession, in which the community demonstrations were made, in closer harmony with each other.

I have tried very hard to work out some plan through which we could work up other clinics. The State Board of Health ought never to handle money from outside sources. I do not think it could put a charge on any service it rendered. For that reason, we could not put on anything except through the Alabama State University. We have never been able to formulate a workable plan. Some plan ought to be worked out in every state in the South to establish an agency that would promote clinics in rural districts and bring the teacher to the physicians. It has a marvelously beneficial effect and ties on to the medical organization, the health organization better than anything we have undertaken. I commend it to all health departments.

Dr. Weech (closing).—The question of the expense of such an undertaking is a most important one. I have not the exact figures. A rough estimate places the cost at about $2,500 for each summer.

In regard to the examination of the normal child, I might say that the importance of such examinations was not overlooked. Scarcely a clinic was held in which one or more of these children was not given a routine examination. Almost never was there any difficulty in providing examples of such cases. Our problem lay in limiting the number of normal children brought to the clinic.

RESULTS OF INJECTION OF GASSERIAN GANGLION WITH ALCOHOL FOR CURE OF TRIFACIAL NEURALGIA OF TYPE KNOWN AS TIC DOULOUREUX*

By R. C. Bunting, M.D.,
Memphis, Tenn.

There are many types of trifacial neuralgia, but there is only one, outstanding, clearcut neuralgia of the fifth nerve that is intractable except through surgical measures, and that is tic douloureux. I suppose every one in the audience has at some time had a case or cases of tic douloureux. He has felt his helplessness, and the patient has felt the hopelessness of it. Palliative medical treatment is inadequate, as you know. That offers two alternatives to the patient: injection of the gasserian ganglion, or resection of the posterior root of the ganglion.

The symptoms of this type of case are classical. The patient may be talking comfortably to some one, and like a flash the pain is on. The face becomes red, tears may be shed, the body is usually thrown forward, and the patient cannot utter a word because of the severity of the pain. Many have what are called "trigger zones." Touching the lip or side of the nose, swallowing fluids, cold, or even warm breezes, will start them off into these attacks of horror. In general, this describes the tic douloureux of trigeminal neuralgia.

The cutting operation I have no personal interest in because I do not do it, but I am interested in the injection method. The operation as done is practically that of Hartel.

The needle is usually 10 cm. in length. The index finger should be within the mouth and used as a guide while the needle is being passed from a point one-half inch lateral to the angle of the mouth, upward, inward and backward until it reaches the smooth plate of the infratemporal surface, which is just anterior to the foramen ovale. Manipulating the needle gently, the foramen is soon found, which is told by the lack of resistance that has been felt up to the time the needle point entered the foramen. When the needle point is in the foramen a line drawn from its insertion into the cheek to its entrance into the foramen should bisect the tubercle of the zygoma. If the needle is not in

*Clinic, Clinic Session, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

that place, the foramen ovale has not been entered by the point, and it should be withdrawn and further effort made to locate the foramen ovale.

Practical experience has taught me that the external orifice of the foramen does not lie in the same plane in all skulls. In some, the foramen is flush with the inferior surface of the greater wing of the sphenoid bone, whereas in another individual the opening of the foramen may be tilted at an angle of some twenty degrees. It is obvious that a foramen that is flush with the base of the skull is much more easily entered with a needle than one placed at quite an angle to the base. Again, experience has shown me that the needle point must enter the cheek in some cases fully an inch to an inch and a quarter lateral to the angle of the mouth for the needle to enter the gasserian ganglion. This is due to the fact that Meckel's cave is farther inward to the median line than is usual. In these cases the needle point goes external to the ganglion if the cheek is pierced at the usual point. When the foramen is reached, unless the patient is asleep or a local anesthetic has been used, there will be considerable pain and it will be wise to withdraw the needle slightly and then find the margin of the foramen. This is merely a precaution to make sure that any movement the patient may have resorted to when pain was felt has not displaced the needle point.

If injecting the mandibular division, five to seven drops of alcohol are sufficient to be put into the ganglion. At this point step away from your patient, wait a few moments and then test for anesthesia. This will show you whether your needle has penetrated only to the depth necessary for injection of this division. If the anesthesia shows on the upper lip, you are made aware that the depth of the needle was sufficient to include part or all of the second division. Usually, one is able to inject one or more divisions, as may be desired, depending upon the depth of the needle point in the ganglion. Very superficial penetration of the ganglion will usually make the third division insensitive; a trifle greater depth of the needle point will enable you to include the second division with the third and a greater depth into the ganglion will give anesthesia of all the divisions.

A word as to whether you shall use local anesthesia or general. I have used both and I have performed the injection without any anesthetic at all. All in all, I prefer gas anesthesia in these cases. This is given, the needle is quickly passed into the cheek muscle, and the base of the skull and the foramen is sought under complete anesthesia. When I am sure of the position I awaken the patient and wait ten or fifteen minutes, until she is cognizant of her environment, and then start injecting the alcohol. In this way I can usually find the position I want as the needle is pressed home. If you prefer the local anesthetic I would advise the use of novocain in preference to any other. The objection to doing the complete operation under general anesthesia is that it is not unusual to find that you have missed your objective after the patient is back in the hospital room.

I had hoped to have four patients here this morning, but have been disappointed and have only two. One of them was injected in January, 1924, and the other in January, 1927. The injection of the gasserian ganglion is as permanent as the resection of the posterior root of the ganglion, or the removal of the ganglion. There is no regeneration of the nerve cells, and the result is just as permanent as that secured by the other method.

I think the type of needle one uses does not make much difference. It should be long enough and flexible, and one that will not break. You can use as small a needle as you wish. After the needle has reached its objective, a small syringe is attached and the alcohol then injected.

(Presenting patients.)—These ladies have been kind enough to come here this morning, and any of you who wish to test them is privileged to do so. One of these was a bilateral affair. I injected the left gasserian ganglion; in addition there was involvement of the infra-orbital on the right. The left face is entirely dead to pain. On the right, knowing that I had to preserve the chewing muscles, I could not inject the ganglion. The bilateral cases are not frequent. I think I have seen only three in my practice. The other case is of the usual type.

To Patient.—How long did you have the trouble before I injected you?

Patient.—About twenty-five years. I suffered a long time before I had anything done.

Dr. Bunting.—The other patient had the trouble for six years before she had the injection. It is obvious to all that when doing a ganglion injection the eyelids on that side must remain closed because the cornea is insensitive. The eye is washed out with argyrol for a few days, and after that with boric acid. About fifteen days after the injection the eyelid can be left open, but before that there is likely to be infection from dust or other cause.

To Patient.—Has there been any return of your pain?

Patient.—Not on the left side, but some on the other.

Dr. Bunting.—On the right side in this case I simply did a peripheral injection of the infra-orbital nerve, which is entirely temporary and has to be repeated about every six months.

Question.—Do you recommend this in all cases in preference to surgical measures?

Dr. Bunting.—I do, because I do not do surgery. This operation leaves no scar and the patient can leave the hospital the same day if necessary. I injected one patient from Arkansas who had a blood pressure of over 300. I performed the injection at about 4 o'clock in the afternoon and she returned home that night, saying she could not remain away. If there is any return of pain you may be sure the injection was faulty. I have never had such a case.

Question.—What are the dangers of this procedure?

Dr. Bunting.—The dangers are those of infection, but they are not great. If the needle goes too far there may be paralysis of the sixth, seventh or eighth nerves. I have had that happen, but it is a peripheral destruction and only temporary.

Question.—What is the usual cause of the trouble?

Dr. Bunting.—The cause is not known. Sclerosis of the ganglion has been given as a cause, but it does not seem to be proved. In other types of trifacial neuralgia there are many causes: infection of the antrum, carious teeth, sinus infection, and so on, but the pain of tic douloureux is classical. I believe that any pain in the trifacial distribution that lasts over two minutes is not tic douloureux. As I said, I have had no return of pain in any of my cases. If you do not locate the ganglion at the first attempt the procedure can be repeated the next day, or the same day if necessary. There is no return of symptoms if the injection is properly carried out.

CONGENITAL STENOSIS OF THE CONUS ARTERIOSUS WITH ECTASIA OF THE PULMONARY ARTERY AND BACTERIAL ENDOCARDITIS OF THE PULMONARY VALVE*†

By L. W. NABERS, M.D.,
Rochester, Minn.

The case is that of a white woman, 48 years of age, admitted to Asbury Hospital November 17, 1927, complaining of chills, fever, weakness and drowsiness. The illness dated back three months to an attack of what was called "intestinal flu," complicated with severe cystitis. Although very weak she was able to be up and around after this illness until November 10, when she had a "fainting attack" and had been confined to bed ever since. For the past week she had had one or two severe chills daily, each followed by a rise in temperature. After the chill she would be very drowsy and usually sleep for a long time. She made the statement that she had always had a heart murmur; in fact, believed that she was born with it.

She was usually healthy. There was no history of rheumatic fever, but she had had frequent attacks of sore throat and diphtheria in 1907, which were of more than moderate severity. Her father and mother both died of apoplexy at the ages of 57 and 76, respectively.

The physical findings at the time of admission were negative except for a loud systolic murmur heard over the entire precordium, which was loudest in the third left intercostal space, immediately adjacent to the sternum. The pulse rate was 92, temperature 99.4°, and blood pressure 84/50.

Blood, November 18.—Hemoglobin (Dare) was 100 per cent; red cells 5,200,000; white cells 17,500; polymorphonuclears 55 per cent; lymphocytes 43 per cent; large mononuclears 1 per cent; and transitionals 1 per cent.

The urine had an acid reaction; specific gravity 1.012; albumin 2 plus (on basis of four as a maximum); sugar negative; 4 or 5 pus cells per low power field; and many red blood cells.

November 23 a blood culture gave a pure growth of hemolytic streptococci.

The progress was one of gradual failure. Generalized petechiae appeared December 10. The patient died December 31, 1927.

Post-mortem Examination.—January 1, 1928, the body examined is that of a well developed and well nourished white woman, 168 cm. in length and weighing about 140 pounds. There is generalized edema and slight cyanosis of the lips and nail beds. The left pupil is larger than the right and is irregular in outline. The left pleural cavity is completely filled with a thin, slightly bile-colored fluid; the right contains 300 c.c. of similar fluid. The pericardial sac contains 200 c.c. of thin purulent fluid.

The pulmonary artery is very prominent and is definitely enlarged near its origin. It measures 10.5 cm. in circumference at this point and shows a saccular aneurysm pointing to the left. Upon opening the pulmonary artery a large firm thrombus is found which involves two of the cusps as well as the aneurysmal pouch which is adjacent to them. The pulmonary valve is markedly insufficient because of dilation of the artery at the point of attachment of the leaflets. One of the commissures shows a wide separation of the leaflets. Large thrombotic masses are attached to the leaflets, but no old thickening of the leaflets can be demonstrated. Immediately proximal to the pulmonary ring are two blind pouches, one of which leads to the right, the other downward in the wall of the right ventricle. These pouches are 1 cm. at their mouths and extend for a depth of 2.5 cm. In the conus arteriosus, at a distance of 1.5 cm. from the pulmonary valve, there is marked stenosis, the narrowed portion being 8 mm. in diameter and 1 cm. in length. There is marked hypertrophy of the right ventricle as a result of this stenosis. The heart weighs 450 grams.

The spleen weighs 200 grams. There is one small infarct on the posterior surface. The liver, gall bladder, gastro-intestinal tract, pancreas and adrenals are essentially negative. The left kidney weighs 175 grams, the right 165 grams. There are numerous petechial hemorrhages of the pelves. The uterus is very small, of infantile type, the uterine cavity being practically obliterated. The abdominal aorta shows only slight

*From the Laboratory of the Department of Pathology, University of Minnesota, Minneapolis, Minn.
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atheroma. The organs of the head and neck are not examined.

Microscopic Examination.—The kidney shows typical diffuse embolic glomerolonephritis. The heart muscle is normal. There are no Aschoff bodies.

SUMMARY

There is, therefore, a congenital anomaly of the heart of which the outstanding feature is the stenosis of the conus arteriosus. The pulmonary artery is greatly dilated and the pulmonary valve greatly insufficient because of the dilation. Because of the stenosis of the conus the effect is that of a pulmonary stenosis and not that of an insufficiency. The pulmonary valve leaflets show a bacterial endocarditis which was the immediate cause of death. Bacterial endocarditis is known to be a frequent complication of congenital cardiac disease.

A REVIEW OF FRACTURES OF THE OS CALCIS: REPORT OF CASE*†

By LEIGH F. ROBINSON, M.D., F.A.C.S.,
Fort Lauderdale, Fla.

The attention of the practitioner is not often called to fractures of the os calcis. Yet this fracture occasions a large number of the disabilities from bone injuries. Fractures of the calcaneum are produced by altitude falls, landing on the feet with stiff knees. The weight of the body exerts a crushing force which produces impactions or comminutions. Some times the tendo Achilles is detached. The treatment always presents great difficulties. The literature shows that no injury gives the insurance companies as much concern. The average disability is from twelve to eighteen months in the face of radical treatment and the cases of more severe character are usually permanently disabled. Cotton found that 90 per cent of these fractures present a permanent partial disability. Magnuson, after a long experience with the Illinois Industrial Board, states that all of these cases show a disability between 35 and 75 per cent.

In 1908, Cotton called attention to the inadequate study given the subject and enumerated the following signs which he found in disabled cases: raising, shortening and outward deviation of the heel, flattening of the arch, projection of fragments into the sole of the foot, loss of motion between the astragalus and the os calcis and mechanical interference between the os calcis and the external malleolus. He further stated that the following causes of disability are not remedial by apparatus but operative measures must be instituted: loss of motion, excessive bony thickening below the external malleolus, bony spurs in the sole and outward and extreme upward displacement of the heel. In another article published in 1916, he called attention to the importance of correction of deformity by loosening up the fracture by manipulation, pulling down the heel with the aid of a steel sound, re-establishing joint motion between astragalus and os calcis, impacting of displaced bone under the external malleolus with mallet and sand bag, and plastering in plantar flexion.

Reich claims that the disabilities are almost invariably due to a comminution of the bone which results in an osteo-arthritis. He states that this explains the pain in supination and pronation of foot. His treatment is an arthrodesis of the subastragaloid joint through a horizontal incision, and a ninety day cast.

Hall states that temporizing is disastrous. Too much conservatism gives bad results. Careful roentgen study is urged. He treats recent cases by lengthening the tendo Achilles, breaking up impactions and restoring the arch.

Funston in the most recent article in the literature, outlines the treatment that he and Hall follow, which is based on 100 operated cases. He also points out the necessity for accuracy of x-ray diagnoses. He describes instances in good hospitals where the first x-ray report was favorable, but a later checking up showed that the surgeon had been misled. He describes the important points of latent disability as follows:

"(1) Irritation of the calcaneo-cuboid joint and the calcaneo-astragaloid joint by displaced fragments. (2) Lateral displacement of the fragments causing impingement on tissues and interference with tendon motion. (3) Flat foot and knock ankle deformity causing improper weight bearing. (4) Loss of the usual length of the os calcis by impactions."

The type of operation which he and Hall have standardized in fresh cases is as follows: (1) The patient is allowed to rest four to eight days until the swelling begins to subside. (2) The tendo Achilles is lengthened by the sliding method. (3) Impactions are broken up and the fracture is reduced with a 24 F. sound, after the manner of Cotton. He turns the patient on his stomach and puts counter pressure on the arch with a padded wooden board sustained against the operator's chest. (4) The inner side of the foot is placed against the bag and the fragments under the outer malleolus are impacted with a mallet and roll bandage. (5) When the restoration is

*Read before the Broward County (Florida) Medical Society, Ft. Lauderdale, Fla., May 14, 1927.

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complete a cast is carefully applied with the foot in inversion at a 90 degree angle. The cast is not disturbed for four weeks when the outer half is removed. At six weeks the foot is removed for daily motion. All cast is removed at eight weeks and at ten weeks weight bearing is begun.

For late operations whether it be six months or six years, Magnuson makes a generous lateral incision around the external malleolus. The embedded peroneal tendons are freed and are placed in a new groove, which is made by chiseling through the callus and bone. The foot is then forced into inversion by a foot wrench in which position it is placed in a cast.

Harding does not employ Cotton's mallet impaction or lengthen the Achilles tendon. He uses an orthopedic block on a screw top stool on which the sole of the foot is placed. A cabinet maker's "D" clamp is applied to the sides of the os calcis. The fore foot is forced down with one hand while the retractor is simultaneously forced down with the other until the desired amount of correction is affected.

REPORT OF CASE OF PATIENT WHO REFUSED OPERATION

Patient O.B.K., a lineman, fell from an electric pole and received a fracture of the os calcis, September 23, 1926, during the days following the hurricane, when x-rays were not available and satisfactory. The foot was treated by cast and inversion. He left the hospital October 7, but did not report back until January 18, 1927, when he came in complaining of pain and tenderness under the external malleolus. He was unable to bear weight and had pain on supination and pronation. The foot showed outward deviation of the heel, loss of the arch, a widening of the foot with new bone and callus under the external malleolus, displacing the perioneal tendons. There was a spastic eversion of the foot, prominence of the internal malleolus, flat foot gait, limited motion of the subastragaloid joint and severe pain on the bare attempt to bear weight. These symptoms have persisted to date. The x-ray shows the eversion of the calcaneum, widening of the lateral diameters of the bone, callus and outer plate protrusion under external malleolus and flattening of the arch.

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First National Bank Building.

POLYCYTHEMIA VERA*

By J. A. McIntosh, M.D.,
Memphis, Tenn.

I am impressed by the large number of diseases in which we find too many cells of certain kinds and those in which there are too few (presenting patient). This patient presents a disturbance of blood cell equilibrium, too many erythrocytes.

He is forty years old and has been under observation since November, 1925. He is a railroad police inspector, and came to the Memphis General Hospital complaining of pain in the left chest, dizziness, nervousness and headache.

His mother is living at seventy, and in fair health. His father died at sixty-two from an acute intestinal illness. He has nine brothers and sisters, all living, and he has six children, all in good health. He was reared in Indiana.

He had the usual diseases of childhood, and he has had malaria several times. At one time he was told that he has syphilis. His blood gave an indefinitely positive Wassermann reaction. Treatment was instituted for this and he received six doses of neo-arsphenamin, and a small amount of mercury. In 1916 the Wassermann test was reported negative.

The present symptoms began in 1922, and the Wassermann reaction then was said to be slightly positive. He was given fifteen injections of mercury and five of arsphenamin. In 1923 the Wassermann reaction was again negative, and it has been negative on three subsequent examinations. In 1925, he was hospitalized in

*Clinic, Clinic Session, Southern Medical Association, Twenty-First Annual Meeting, Memphis, Tennessee, November 14-17, 1927.

Kentucky because of severe headache. For the first time the red blood cells were found to be too high, 8,900,000. The removal of 1,500 c.c. of blood from a vein relieved the headache. Four days later his tonsils were removed and this was followed by severe bleeding. He was transfused twice because of this hemorrhage. For the past several years his friends have called him "Red." I think you will all agree with me that his face is red enough to justify that name.

He takes "cold" frequently and has pain in the chest, which bears no relation to the taking of food or exercise, and occurs only in the daytime. Dizziness occurs only when he stoops over, and shaking his head relieves this feeling after an upright position is assumed. He states that he feels as if he is under a "strain" all the time. He sleeps well, is constipated and has a fistula in ano.

Laboratory examination revealed the following: his weight is 64.8 kilos; total blood volume 10,570 c.c. (normal average, 5,437 c.c.); normal plasma volume 4,860 c.c. (normal, average, 3,125 c.c.). Per cent of red blood cells, 54; per cent of plasma, 46; per cent of hemoglobin, 125. Total red blood cells 8,820,000; color index 0.7; volume index 0.7. The total platelets were 360,000; total leukocytes 14,000. Differential count: polymorphonuclears 77.3; lymphocytes 10.3; large mononuclears 4.3; eosinophils 6.5; basophils 1.6; reticulated red cells 0.75 per cent. The total non-protein nitrogen 34.28 mg. per 100 c.c. of blood. Blood glucose was 0.112 per cent; creatine 1.6 mg. The feces were negative for ova; routine urinalysis was negative, as was also the blood Wassermann reaction.

The large mononuclears indicate the activity of the reticulo-endothelial system.

We have kept the patient under observation during a two year period, and he has received x-ray treatment. Several remedies have been tried. About twenty total erythrocyte counts have been made, the last being 10,525,000, October 4, 1927. The lowest was in march, 1926; then the count was 7,600,000, and the highest was in January, 1926, when it was 11,100,000. At that time we began daily doses of 0.1 gm. phenylhydrazine. Three weeks later he became intensely jaundiced, the spleen was palpable, and he was quite sick. We followed the leukocyte count and it went up to 14,650. The erythrocyte count fell to 7,600,000. This treatment was discontinued. Intermittent x-ray treatment has been continued until the present.

Recent blood examinations show the following: catalase, twice normal; icterus index, 143; blood calcium 9.8 mg. total platelets, 210,000; reticulated erythrocytes 8 per cent (842,000) (normal 100,000); volume index 0.73; average size 5.5 microns; color index 0.6; saturation index 0.78 per cent bleeding time 1.5 minutes; prothrombin time 10 minutes; coagulation time 12 minutes; phosphorus 8.9 mg. (normal 3-5); sedimentation rate 9 mm. in 18 hour; viscosity 18.80 (normal 4.55); blood pressure 120/70; metabolic rate 10; blood serum potassium 108.9 mg. (normal 19.5 mg.).

At this time he actually has eight times as many young red cells as he should have in the peripheral blood, while the rate of destruction is only twice normal. So they naturally accumulate in the circulation. The blood phosphorus is three times the normal value. His total platelets now are 210,000. Probably there is something wrong with the platelets, because the clot is feebly retractile. The blood cells now average 5.5 microns in diameter.

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C. P. LORANZ, Secretary-Manager

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EDITORIAL DEPARTMENT

SOUTHERN MEDICAL ASSOCIATION
Twenty-Second Annual Meeting
Asheville, North Carolina
November 12-15, 1928

HENRY HAGER MARTIN, THE ASSOCIATION'S FIRST PRESIDENT

IN MEMORIAM

In the death of Dr. Henry H. Martin, which occurred at his home in Savannah, on June 11, the medical profession of the South has lost one of its great leaders and benefactors. Dr. Martin was the founder of the Southern Medical Association and throughout the years of its growth and expanding usefulness, until his health failed a few years ago, he was foremost among those who worked for its upbuilding.

Dr. Martin was born in 1868 at Ashland, Kentucky, and received his academic education in his native state. He was graduated in medicine from the Medical Department of the University of Cincinnati in 1891. He then spent several years in New York hospitals preparing for the the specialty of ophthalmology and rhino-oto-laryngology. His studies did not cease with the termination of his hospital service, for every year until the automobile accident which almost cost him his life about ten years ago, he visited some of the medical centers to see, and learn from other men, the progress in his chosen field of medicine. He not only learned from his peers, he was constantly imparting his practical knowledge to others by reading papers and taking part in the scientific discussions of many medical societies. Indeed with Dr. Martin life was, as with Osler, one medical meeting after another; and few men in the South contributed more to medical literature.

Dr. Martin was a regular attendant of, and one of the leaders in, his local medical society, having been President of the Chatham County (Savannah) Medical Society. He likewise was prominent in his state society, and when a comparatively young man, in 1905, was elected President of the Georgia State Medical Association. Dr. Martin was particularly active in the work of the national societies dealing with his specialty, having been a member of the American Trio-

DR. HENRY HAGER MARTIN

logical (Laryngo-Rhino-Otological) Society and the American Academy of Ophthalmology and Oto-Laryngology. He was also a regular attendant of the meetings of the American Medical Association; and, during his active years, he probably contributed more papers to the Sections on Ophthalmology and Oto-Laryngology than any other Southern physician.

Dr. Martin was an ardent Southerner, believing in the customs and traditions of the old South; and first of all he was a Southern gentleman, with all that the term implies; yet he was

vibrant with the art and science of medicine of the present day. He deplored the fact that Southern physicians were not writing of, and therefore recording in medical history, the marvellous progress they were making; and his main idea in founding the Southern Medical Association, and in aiding the establishment of a stable, representative medical journal in the South, was to give them greater opportunity for expression.

Dr. George C. Savage, of Nashville, deserves the credit for first suggesting the enlargement of the Tri-State Medical Society of Georgia, Alabama and Tennessee into the Southern Medical Association. In his address as President of the Tennessee State Medical Association in 1905 he suggested the advisability of organizing six states into a Southeastern branch of the American Medical Association. Dr. Savage invited the presidents of the medical associations of Georgia, Florida, Alabama, Mississippi, Louisiana and Tennessee to meet with the Tri-State Medical Society at Chattanooga in 1906 to confer on the subject; and there the Tri-State was merged into the Southern Medical Association. Dr. Martin was elected the first President and he with Drs. W. W. Crawford, Jere Crook and Raymond Wallace, sat up all of one night and wrote the Constitution of the Southern Medical Association. Dr. Oscar Dowling was elected Secretary and Editor of the Journal of the Southern Medical Association. The members of the Southern Medical should never forget the work and the sacrifices, financially and professionally, of Dr. Dowling in the upbuilding of the Southern Medical Association in its early years of struggle.

During the year 1906, and many times subsequently, Dr. Martin visited, at his own expense, the six states comprising the Southern Medical Association, and succeeded in enlisting the interest of many of the leaders in the medical profession in the organization. The first meeting after its organization, held in Birmingham in November 1907, was well attended by the physicians of six states; and largely through the efforts of Drs. Martin and Dowling, the success of the Southern Medical Association was assured. On retiring as President in Birmingham in 1907, Dr. Martin was made Chairman of the Council, which position he held until in 1924 when his health would no longer permit his attending the meetings.

At the Hattiesburg meeting in 1911 it was decided to expand the Southern Medical Association so as to take in fourteen Southern states and the District of Columbia; and in 1912 Dr. Martin, and a number of others, who were then interested in the Southern Medical Association attended the meeting of the American Medical Association, with the idea of selecting councilors from the nine states not before represented. Their efforts were highly successful and at the Jacksonville meeting that fall all fifteen states were represented. The Southern Medical Association has continued to grow until now it has nearly nine thousand members besides many distant subscribers to the Journal. The scope of usefulness of the Association is now second only to that of the American Medical Association. Dr. Martin lived to realize his dream of a great medical association of the entire South, so "the travail of his soul is satisfied."

Like other really great men Dr. Martin had many admirable traits of character which endeared him to his friends. They feel that the inspiration of his clear thinking and his pure heart have enriched their lives; and they know that the medical profession of the South, and the Nation, has profited by his ceaseless efforts for the realization of the highest ideals in the profession.

Dr. Martin's remains were interred in Ashland, Kentucky, where he sleeps beside his parents and the friends of his boyhood. He is survived by his widow, who soothed and comforted him during the years of his illness and suffering. Dr. Martin is mourned by thousands in whose hearts he is enshrined; but the good that he has accomplished, particularly in the founding of a great medical organization in the South, will live through the ages.

ARREST OF DENTAL CARIES

Certain ancient and modern peoples have regularly escaped the dental disease which is now a heavy burden to American and European countries, although, toothache has been a cause of concern from earliest times, and is not a development of the recent civilizations, as one is sometimes lead to believe. Long before the advent of white flour and highly milled grains there were superstitions regarding the origin of toothache, and in nearly every primitive language there were charms to drive it away.[1] The ancient Egyptians are said to have suffered from

1. Kanner, Leo: Folklore of the Teeth. New York: Macmillan Co., 1928.

dental decay as soon as the people learned luxury. Far back in the times of the domination of Egyptian culture, and before, there was a belief that worms were responsible for it. In Babylonia toothache was supposed to be caused by a demon that was identified with a worm.

"After Anu (had created the heavens)
The heavens created the earth,
The earth created the rivers,
The rivers created the canals,
The canals created the marsh,
The marsh created the worm,
Then came the worm weeping before Shamash;
Before Ea came her tears:
'What wilt thou give me for me food?
What will thou give me as mine to destroy?'
'I will give thee the ripe figs and soft pomegranates.'
'Me! What are these ripe figs to me, and soft pomegranates?
Lift me up, between the teeth and jaw-bone set me,
That I may destroy the blood of the teeth, and ruin their strength,
Grasp the prong and seize the root'."

The American Indian is said to have had very nearly perfect teeth. The chief of a party of Indians which visited London in the middle of the Nineteenth Century said:

"That one of the most striking peculiarities which all Indian tribes discovered amongst the white people was the derangement and absence of their teeth, and which they believed were destroyed by the number of lies passing over them."[2]

The negro school child a few years ago was said to have better teeth than the white school child. It has been said that 96 per cent of children coming to this country from Southern Europe have sound teeth, while the teeth of 96 per cent of the American children are defective.[3]

Boyd and Drain,[4] in Iowa, in the course of repeated routine examinations of children observed numerous instances of definite arrest of caries in children.

"Teeth containing large cavities, which ordinarily would have an area of softened dentin surrounding the zone of destruction, were found instead to be very dense. In these mouths in which there was evidence of rapid and extensive involvement of many teeth, further invasion was shown by subsequent examinations to be checked, and open cavities did not show any signs of progress months after they had first been described. * * * * Some teeth showing unquestionable arrest of caries were found in the most poorly kept mouths.

"When these dental observations were correlated with the medical histories of the patients, it was found that without exception the children with arrested caries were all diabetic patients who had been under careful management for six months or more."

These authors believed that the careful attention to diet of the children, and administration of foods rich in mineral salts and vitamins was the cause of the arrest of caries, and that the response to this diet indicates the dependence of dental caries upon recent dietary inadequacies, such as might be associated with the usual food intake of the average child. The diet used was high in natural fat, low in carbohydrate. The same type diet is recommended by certain physicians in the treatment of epilepsy: high fats are used to produce ketosis, and children on this diet have been reported to remain in excellent condition.[1] The optimum quantity of fat and fat solubles vitamins for human growth and maintenance has not been determined. They are perhaps higher than is usually thought.

Undoubtedly, application of laboratory studies in nutrition will improve the condition of invalid teeth, just as it improves the general health of the patient. Enamel defects will predispose a tooth to caries, though the defects are variously produced. Heredity and some local factor work with defective nutrition in evolving abnormal dental conditions; and human experimentations with the effect of diet on teeth should logically begin in the prenatal period. It is of great interest, if it is confirmed, that a diabetic diet can cause rapid arrest of developing dental caries in a child, and should be very encouraging news to the present generation which is beyond the possibility of prenatal care. This is dental treatment from a new angle.

2. McCollum, E. V.; and Simmonds, Nina: The Newer Knowledge of Nutrition. New York: Macmillan Co., 1925.
3. Ibid., p. 480.
4. Boyd, J. D.; and Drain, C. L.: Arrest of Dental Caries in Childhood. J. A. M. A., 90:1867, June 9, 1928.

PHOSPHORUS IN THE METABOLISM OF SUGAR

The utilization of sugar after insulin injection is a complex process, and affects many substances beside the two named.

The phenomena of muscle contraction depend upon the presence of available carbohydrate or glucose in the muscle. Whenever muscular contraction takes place, lactic acid is formed from oxidation of carbohydrate; and phosphoric acid is formed in equimolecular proportion.[2] As carbohydrates usually contain no phosphorus, another substance must be the source of the phosphorus regularly formed during muscle con-

1. Editorial, Ketosis for Epilepsy. JOURNAL, 20:252, 1927.
2. Howell, W. H.: Text Book of Physiology. Ninth Ed., Philadelphia: W. B. Saunders Co., 1925.

traction. If this is not supplied through the diet, it probably must be taken from the tissues.

After insulin is given to dogs, a rapid fall in the blood phosphates occurs which runs almost parallel with the drop in blood sugar.[1] The phosphorus remains low for four to six hours after insulin injection, then rises fairly rapidly, its rise preceding the rise in blood sugar. As the blood phosphorus falls, excretion of phosphorus through the urine ceases completely for six to eight hours, after which phosphorus reappears in amounts larger than normal. The twenty-four hour excretion of phosphorus is augmented more than one-fourth. After insulin, then, not only is glucose lowered in blood and urine; the metabolism of sugar and phosphorus is so intertwined that there is simultaneously an increased excretion of phosphorus.

The internal secretions which have been isolated have not been peculiar to warm blooded animals, but have usually had similar effects upon men, animals and fishes. Goitrous men, sheep and mullets have been reported, and insulin has been obtained from fish. Insulin in man causes hypoglycemia, and convulsions. If insulin is put in water in which fish are swimming, it will throw them into convulsions, from which they recover on receiving dextrose.[2]

Fish, like human beings, use glucose better in the presence of phosphorus. Burge and Estes made observations upon the utilization of glucose in the presence of certain inorganic salts by gold fish and paramoecia. A number of bowls containing 0.1 per cent dextrose were prepared, and to them various salts were added. Chlorids, phosphates, and sulphates of sodium, potassium, calcium and magnesium were added. Most of these had no effect upon the quantity of glucose used in thirty hours by a given number of fish. Thirty-three per cent of glucose was usually used. In the presence of magnesium sulphate, only 21 per cent was used, due it was thought to its anesthetic effect. In the presence of 200 grams of disodium phosphate, the sugar utilization rose to 46 per cent. In the presence of 100 grams of dipotassium phosphate (used in less quantity because of the toxic effect of potassium ion) 68 per cent of the glucose was used. In fish as in men there is a definite correlation between phosphorus and sugar metabolism. If phosphorus is present, sugar is used more readily. In the absence of an excess supply of phosphorus, one may suppose that, as was said above, phosphorus must be supplied by the tissues.

The fact previously reported that blood and urinary phosphorus are decreased after intravenous injections of glucose alone or of insulin alone, and that fish use glucose better in the presence of phosphorus corroborates a suggestion made in a previous editorial: that phosphates in some form are indicated when glucose or insulin injections are given therapeutically. Insulin and glucose are being given for malnutrition, to expedite weight gaining of children or psychotics, post-operatively and for a number of conditions. The phosphorus can not arise *de novo*. It must come from somewhere, and the presence of a mobile supply of stored tissue phosphates has not been shown. When the highly purified substances, glucose and insulin, are given to a patient, this other substance which has been shown to be intimately and quantitatively concerned with their utilization should also be supplied. The best method of accomplishing this in routine work is yet to be described.

1. Eadie, G. S.; McLeod, J. J. R.; and Noble, E. C.; Further Experiments on Activity of Insulin. Amer. Jour. Physiol. 72: No. 3, May, 1925. Editorial, Extra-Diabetic Use of Insulin. JOURNAL. 18:484, 1925.

2. Burge, W. E.; Estes, A. M.: A Study of the Inorganic Constituents of the Body with Respect to Their Stimulating Effect on Sugar Metabolism. Amer. Jour. Physiol. 85:103, May, 1928.

Asheville—Where We Meet

SPORTS AND SCENIC ATTRACTIONS*

Asheville's appeal is a many sided one. Outdoor sports have become one of the chief interests of the region, due perhaps to the mountain climate which is conducive to outdoor activities in all seasons.

To the golfer Asheville offers a variety of play seldom equalled in any one city. Four excellent courses are now under play and a fifth will be completed by the time the Southern Medical Association gathers for its annual convention in November. Asheville's Municipal Course and eighteen hole Donald Ross lay-out are tests for the skill of any golfer. The seventeenth green is the highest green in Eastern America and commands a panorama of scenery unexcelled. The eighteen hole Asheville Golf and Country Club, the Biltmore Forest Course, the nine hole Malvern Hills Links and the eighteen hole Lakeview

*By John D. Topping, Publicity Director, Asheville Chamber of Commerce.

Course will all be available to the golfing members of the Southern Medical Association.

The altitude of Western North Carolina, and particularly that portion lying between the Blue Ridge on the east and the Great Smoky Mountains on the west, is an optimum one. With an average height of 2500 feet above sea level this rolling plateau is blessed with a climate which is well suited to outdoor life. The elevation is conducive to cool summers and the position of this region in the midsouth keeps the winter months free from the unpleasant extremes of cold weather.

The natural climatic advantages of the southern mountains have long been recognized. Asheville, N. C., has been a noted resort for many years. Around this city in the region which has been so aptly termed "The Land of the Sky" are numerous points of interest. Mt. Mitchell, the highest mountain in the eastern part of the United States, is located a short half day's trip from Asheville. A motor road winds to the summit of this impressive elevation and from the tower located on the crest the beholder views a panorama of gorgeous mountain scenery.

The history of Western North Carolina as a resort region dates back many years. Near Hendersonville are still to be found many colonial mansions established by residents of Charleston and other Southern cities who early learned the advantage of spending the summers in the cool atmosphere of the mountains. With the coming of railway connections the resorts grow in size and in numbers. Today with the development of the excellent highway system of North Carolina linked with the highways which reach to all parts of the nation Western North Carolina has gained a still greater popularity with the touring public. Air ports are being planned by the cities of this region in preparation for the traveler of the skies who will soon supplement the motor tourist.

It would require many days for the visitor actually to see all that is worth seeing in Western North Carolina. The mountains are never monotonous. Each range has an individuality, a series of distinct characteristics, each vista presents a fresh viewpoint. One should visit Chimney Rock, famous granite monolith perched on the sheer slopes of a mountain, a thousand feet above the blue waters of Lake Lure. Here the highway engineers have made natural wonders accessible to the motorist and a winding highway climbs to the base of the rock.

The Biltmore Forest Country Club

To the west of Asheville the Great Smoky Mountains, last of the eastern wilderness, hide themselves behind their impenetrable barrier of foothills. Bear, deer and other large wild animals still inhabit the wilderness of the Great Smokies. Here the last vestige of the virgin wilderness is to be found, giant poplars, aisled forests of spruce and balsam. Within a few

months the Great Smoky Mountains will become a national park, their beauty and rare wildness to be preserved for all time.

The Sapphire Country, Linville Falls, tumbling down a hundred feet into the gorge of the river of similar name, majestic Caesar's Head, venerable Mount Pisgah, the Royal Gorge sloping toward the Piedmont region of the State, hurrying rivers, trout streams with the clarity of crystal, cool verdant valleys overhung with the bluest of skies, a clear sparkling atmosphere, these are the characteristics of the Land of the Sky.

In Asheville there are hostelries which have gained national fame. Grove Park Inn, set in the midst of its beautiful gardens, Kenilworth Inn, The Manor, the Battery Park, the George Vanderbilt, the Asheville-Biltmore, and many others entertain the visitors who make headquarters at Asheville. There are numerous mountain inns and hotels in the nearby cities and towns of the Land of the Sky which entertain many guests each year.

Tennis, aquatic sports in season, horseback riding, hiking, motoring, fishing in the well-stocked streams of the National Forest and hunting during the open seasons are among the outdoor recreations offered by the Land of the Sky. Motoring over the superb highway system of this section, amid everchanging mountain scenery, is one of the attractive pastimes enjoyed by visitors.

The yearly program at Asheville includes a series of interesting social and sports events. Golf tournaments are scheduled during the major portion of the year as monthly events at all the clubs. The climax of the golfing season is reached in the invitation tournaments held at the two major clubs during July and August. The Historical Ball in February, the annual horse-show and art exhibit in April, the Rhododendron Festival in June, the annual opera season in August, the Indian Fair in October, the Mountain Arts Festival in December are among the interesting events on the annual program.

Book Reviews

The Simple Goitres. By Robert McCarrison, C.I.E., M.D., D.Sc., LL.D., F.R.C.P., Associate Fellow of the College of Physicians, Philadelphia; Lieut.Colonel Indian Medical Service; Pasteur Institute, Coonoor, S. India. 106 pages, illustrated. New York: William Wood and Co., 1928. Cloth, $4.00.

The contents of this short monograph by Dr. McCarrison formed the subject matter of a report to the International Conference on Goiter at Berne, Switzerland, in 1927.

He divides simple goitre into three types, parenchymatous, colloid and lymph-adenoid and discusses the geographical distribution and causation of each.

In fine, he seems to show that iodin deficiency is not the only cause of simple goitre but that unhygienic living conditions and especially unhygienic water supply are causative factors as well. Evidence is cited to show that toxins absorbed through the intestinal tract from the polluted water are the causative factor in these cases but no particular organism or organisms are accused.

The last half of the book is composed of illustrations, microscopic sections of glands and charts.

The book is short and well presented.

Books Received

Operative Surgery. By J. Shelton Horsley, M.D., F.A.C.S., Attending Surgeon, St. Elizabeth's Hospital, Richmond, Va. Third Edition. 893 pages with 756 original illustrations. St. Louis: C. V. Mosby Co. Cloth, $15.00.

Urinary Analysis and Diagnosis. By Louis Heitzmann, M.D., New York, formerly Professor of Pathology and Bacteriology, Fordham University School of Medicine, Fordham, New York, N. Y. Fifth Revised Edition, with 131 illustratons and a chapter on the Determination of the Functional Efficiency of the Kidneys, by Walter T. Dannreuther, M.D., Professor of Gynecology, New York Post-Graduate Medical School and Hospital. 366 pages. New York: William Wood and Co. Cloth, $5.00.

Diseases of the Throat, Nose, and Ear. By Dan McKenzie, M.D., F.R.C.S.E., Surgeon, Central London Throat and Ear Hospital; Editor of The Journal of Laryngology, Rhinology and Otology, 1911 to 1920. Second Edition. Volumes I and II. St. Louis: C. V. Mosby Co.

Brain and Mind, or The Nervous System of Man. By R. J. A. Berry, M.D., F.R.C.S., F.R.S., Edin., Dean of the Faculty of Medicine and Professor of Anatomy, Including Histology, in the University of Melbourne. 608 pages, illustrated. New York: The Macmillan Company, 1928. Cloth, $8.00.

A Handbook of Clinical Gynecology and Obstetrics. By Rae Thornton La Vake, A.B., M.D., F.A.C.S., Assistant Professor of Obstetrics and Gynecology, University of Minnesota; Attending Obstetrician and Gynecologist to the Minneapolis General Hospital. 281 pages, illustrated. St. Louis: C. V. Mosby Co. Cloth, $4.00.

Nurses, Patients, and Pocketbooks. Report of A Study of the Economics of Nursing Conducted by the Committee on the Grading of Nursing Schools, May Ayres Burgess, Director. 618 pages, illustrated. New York: Committee on the Grading of Nursing Schools. Price, $2.00.

Syphilis, A Treatise on Etiology, Pathology, Symptomatology, Diagnosis, Prognosis, Prophylaxis, and Treatment. By Henry H. Hazen, A.M., M.D., Professor of Dermatology and Syphilology, Medical Department of Georgetown University; Professor of Dermatology and Syphilology, Medical Department Howard University. Second Edition, 643 pages, 165 illustrations, 16 figures in colors. St. Louis: C. V. Mosby Co. Cloth, $10.00.

Folklore of the Teeth. By Leo Kanner, M.D., Yankton State Hospital, Yankton, South Dakota. 316 pages. New York: The Macmillan Company. Cloth, $4.00.

Gonococcal Urethritis in the Male, For Practitioners. By P. S. Pelouze, M.D., Associate in Urology and Assistant Genito-Urinary Surgeon at the University of Pennsylvania. Octavo volume of 357 pages, illustrated. Philadelphia and London: W. B. Saunders Company, 1928. Cloth, $5.00.

Modern Methods of Treatment. By Logan Clendening, M.D., Associate Professor of Medicine, Lecturer on Therapeutics, Medical Department of the University of Kansas; Kansas City, Missouri. Second Edition. 815 pages, illustrated. St. Louis: C. V. Mosby Co. Cloth, $10.00.

The Mind of the Growing Child. Edited by Viscountess Erleigh with a preface by Sir James Crichton-Browne. 229 pages. New York: Oxford University Press. Cloth, $1.75.

The Duodenum, Medical, Radiologic and Surgical Studies. By Pierre Duval, Jean Charles Roux and Henri Beeclere of the Surgical Clinic, Faculty of Medicine, Paris. Translated by E. P. Quain, M.D. 212 pages, illustrated. St. Louis: C. V. Mosby Co. Cloth, $5.00.

The New York Academy of Medicine Lectures on Medicine and Surgery. First Serics, 1927. 319 pages with 39 illustrations. New York: Paul B. Hoeber, 1928. Cloth, $5.00.

Epilepsy, Comparative Pathogenesis, Symptoms, Treatment. By L. J. J. Muskens, M.D., of Amsterdam, Fellow of the Royal Society of Medicine, London; General Secretary of the International League Against Epilepsy. Foreword by Sir Charles S. Sherrington, O.M., G.B.E., M.D., D.Sc. Camb., F.R.C.P., F.R.S., Wayneflete Professor of Physiology, Oxford. 435 pages, illustrated. New York: William Wood and Co. Cloth, $8.00.

A Text-Book of Actinotherapy with Special Reference to Ultra-Violet Radiation. By D. D. Rosewarne, M.R.C.S. (Eng.), L.R.C.P. (Lond.), Late Honorary Actino-Therapeutist and Assistant Physician, City of London and East London Dispensary. 237 pages, illustrated. St. Louis: C. V. Mosby Co. Cloth, $4.00.

Injuries and Diseases of Bone. By Sir William Ireland DeC. Wheeler, (Mod.) B.A., M.D. (Dub. Univ.), F.R.C.S.I., F.A.C.S. (Hon.), Surgeon to Mercers Hospital and the National Children's Hospital, Dublin; 148 pages, illustrated. New York: William Wood and Company, 1928. Cloth, $4.00.

A Handbook of Histology. By A. McL. Watson, M.A., Ph.D., Lecturer on Histology, University of Glasgow. 207 pages, illustrated. New York: William Wood and Co. Cloth, $3.75.

Diathermy, Its Production and Uses in Medicine and Surgery. By Elkin P. Cumberbatch, M.A., B.M. (Oxon), D.M.R.E. (Camb.), M.R.C.P., Medical Officer in Charge, Electrical Department, St. Bartholomew's Hospital, Etc.; Examiner in Medical Electrology, University of Cambridge. Second Edition. 232 pages, illustrated. St. Louis: C. V. Mosby Co. Cloth, $7.00.

A Book for Us Diabetics and Our Doctors. By Don H. Duffie, M.D. 80 pages. South Lancaster, Massachusetts: E. E. Miles, 1928. Cloth, $1.50, postpaid.

Southern Medical News

ALABAMA

The twelfth annual meeting of the Association of Alabama Power Company Surgeons was held in Mobile May 14. Dr. T. F. Huey, Anniston, succeeds Dr. H. L. Castleman, Sylacauga, as President: Dr. W. H. Greer, Sheffield, was elected Vice-President; Miss Lucie M. Bouchells, Birmingham, permanent Secretary-Treasurer. Dr. Samuel R. Benedict, Birmingham, is Chief Surgeon and Dr. George E. Blue, Montgomery, Assistant Surgeon. The place of the 1929 meeting was left to the executive board.

Dr. Frank R. Wood, Heflin, has been appointed Health Officer of the new Cleburne County Health unit.

Deaths

Dr. J. Ross Snyder, Birmingham, aged 54, died May 7 of heart failure.

Dr. Malcolm Daniel Smith, Prattville, aged 60, died March 23 of heart disease.

Dr. Thomas Joseph Dean, Union Springs, aged 58, died March 22 of chronic interstitial nephritis.

Dr. Nathan H. Carpenter, Eutaw, aged 56, died April 4.

Dr. Ransom D. Palmer, Carson, aged 64, died March 25 at the home of his daughter in Jackson.

Dr. Robert H. Puckett, Birmingham, aged 51, died March 8 of pellagra.

Dr. John Neilson Furniss, Selma, aged 48, died April 10 of erysipelas.

Dr. Walter Newton Moore, Lisman, aged 53, died April 5 at a hospital in Meridian, Miss., of septicemia.

ARKANSAS

At the fifty-third annual meeting of the Arkansas Medical Society May 1-3, El Dorado, Dr. R. H. T. Mann, Texarkana, was elected President; Dr. Thad Cothern, Jonesboro, President-Elect; Drs. H. H. Niehuss, El Dorado, Othello M. Bourland, Van Buren, and Samuel J. Allbright, Searcy, Vice-Presidents; Dr. Royal J. Calcote, Little Rock, Treasurer; Dr. William R. Bathurst, Little Rock, Secretary-Editor.

Montgomery County Medical Society has re-elected Dr. W. D. Freeman, Mt. Ada, President; Dr. J. H. McLean, Caldo Gap, Secretary-Treasurer.

The Dean of the University of Arkansas School of Medicine, Little Rock, announces the appointment of Dr. James I. Scarborough, Little Rock, as head of the Department of Surgery. He will assume this position September 15.

Deaths

Dr. William Elliott Parker, Hot Springs National Park, aged 60, died April 26.

Dr. James W. Walton, Benton, aged 65, died April 18 in a hospital at Little Rock, of heart disease.

Dr. Adolphus Wann Jernigan, Hardy, aged 47, died March 14 at St. Bernard's Hospital, Jonesboro, of gallstones.

DISTRICT OF COLUMBIA

The new $500,000 Medical School Building for Howard University was dedicated April 9-10, with appropriate ceremonies. Secretary of Interior, Dr. Hubert Work, presented the building. The new building adds 70,000 square feet of lecture and laboratory space. The Government appropriated $370,000 toward its cost and equipment, and the General Education Board, New York, $170,000. A bronze tablet containing the names of sixty-three colored persons who donated $1,000 or more toward endowment of the medical school was dedicated.

The Secretary of War has directed that the name Fort Leonard Wood be given to the military reservation, formerly known as Camp Meade, which is near the main highway between Baltimore and Washington, in memory of the late Dr. Leonard Wood, Major General, U. S. Army. At the time of his death last year, General Wood was Governor-General of the Philippine Islands.

Deaths

Dr. Leight Monroe Higgins, Washington, aged 34, died April 7 of pneumonia following streptococcus viridans septicemia.

FLORIDA

The ninth annual meeting of the Florida Railway Surgeons' Association was held at Tampa April 2. Dr. L. M. Anderson, Lake City, was elected President; Dr. J. M. Dell, Gainesville, Vice-President; Dr. E. W. Warren, Palatka, Secretary-Treasurer.

The following hospitals in Jacksonville have been accredited by the American Medical Association: St. Luke's, St. Vincent's, Duval County, Riverside, Rollins

(Continued on page 34)

BOTH VITAMINS A and D

Are Necessary To Make All Babies Healthy and Happy

If all babies could live in the tropics, clothed as nature intended, spending most of their time in direct sunlight, with proper diet, the problem of rickets would perhaps not exist.

Unfortunately, our babies spend the greater part of their early years indoors, their bodies largely covered with clothing.

Many pediatricians prescribe cod liver oil for all babies, even in summer, as insurance against rickets. Its antirachitic value is well established.

It should be remembered that cod liver oil is the richest available source of vitamin A, and doesn't every rachitic child need that important growth-promoting factor?

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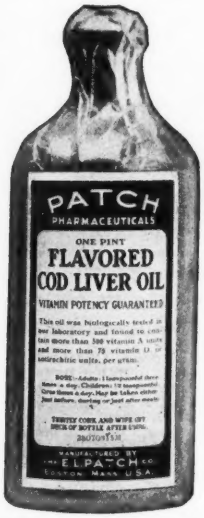

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The least amount of cod liver oil required daily to promote a renewal of growth in albino rats that have ceased to grow and may show symptoms of malnutrition, such as xerophthalmia, on diets adequate except for vitamin A, is considered as one vitamin A unit. We guarantee more than 500 vitamin A units per gram.

Vitamin D (Antirachitic) Guarantee

The antirachitic or vitamin D potency of this oil is determined by a modification of the method described by McCollum, Simmonds, Shipley and Park. The least amount of cod liver oil required daily during a period of eight days, to promote recalcification in the tibia of young albino rats suffering from experimental rickets is considered as one vitamin D unit. We guarantee more than 75 vitamin D units per gram.

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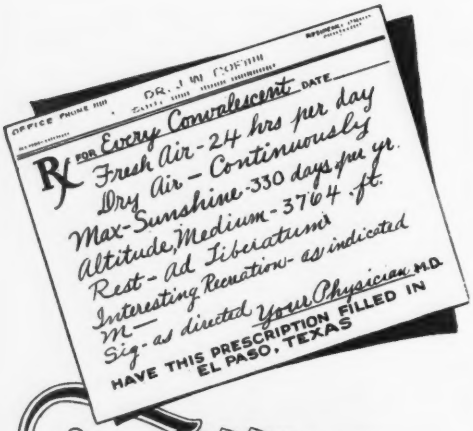
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(Continued from page 592)

Hospital of Obstetrics, and Brewster's (for negroes).

The Good Samaritan and the Pine Ridge Hospitals, Palm Beach, were recently approved by the American Medical Association.

One of the features of the opening of the new St. Vincent's Hospital, Jacksonville, has been the organization of the Ladies' Auxiliary. The following officers were elected: Sister Mary Louise, Honorary President; Mrs. F. J. Waas, President; Mrs. J. K. McIver, Vice-President; Mrs. Vincent Armstrong, Secretary; Mrs. Frank Adams, Treasurer.

C. O. Stimmel is acting Superintendent of the Flagler Hospital, St. Augustine, pending the appointment of a permanent administrator.

Dr. Spencer Tally Trice, Gainesville, and Miss Mildred D. Breaseale, High Springs, were married March 19 at Tifton, Ga.

Deaths

Dr. Daniel H. Simmons, DeFuniak Springs, aged 65, died December 16 of chronic myocarditis and interstitial nephritis.

Dr. Jonathan Sebastian Coker, Arcadia, aged 38, died April 19 at Tucson, Ariz., of acute laryngitis.

Dr. May Clare Robertson, Tallahassee, aged 28, died April 17 at Magee, Miss., of tuberculosis.

Dr. Lon Beckwith Moorman, Laurel, aged 56, died April 8 at Sarasota following an operation on the mastoid.

Dr. Emory E. Ward, Bryceville, aged 74, died April 3 in a hospital at Jacksonville, of acute retention of the urine due to hypertrophy of the prostate.

Dr. Carlos F. Arroyo, Tampa, aged 35, died March 4 at the Tampa Municipal Hospital, of cerebral hemorrhage and chronic nephritis.

GEORGIA

The seventy-ninth annual meeting of the Medical Association of Georgia was held in Savannah May 9-11. The following officers were elected: Dr. C. K. Sharp, Arlington, President; Dr. W. R. Dancy, Savannah, President-Elect; Dr. W. E. McCurry, Hartwell, and Dr. M. Hines Roberts, Atlanta, Vice-Presidents. The next meeting will be held at Macon.

Bulloch-Candler Counties Medical Society has elected Dr. H. H. Olliff, Register, President; Dr. B. A. Deal, Statesboro, Vice-President; Dr. Waldo E. Floyd, Statesboro, Secretary-Treasurer.

Burke County Medical Society has elected Dr. W. W. Hillis, Sardis, President; Dr. J. B. Lewis, Waynesboro, Vice-President; Dr. R. L. Miller, Waynesboro, Secretary-Treasurer.

Cobb County Medical Society has elected Dr. L. G. Garrett, Austell, President; Dr. W. E. Benson, Marietta, Vice-President; Dr. Wm. Mayes Gober, Marietta, Secretary-Treasurer.

Crisp County Medical Society has elected Dr. M. R. Smith, Cordele, President; Dr. L. E. Williams, Cordele, Vice-President; Dr. J. N. Dorminy, Cordele, Secretary-Treasurer.

Lowndes County Medical Society has elected Dr. S. B. Ellis, Valdosta, President; Dr. B. G. Owens, Valdosta, Vice-President; Dr. D. L. Burns, Valdosta, Secretary-Treasurer.

Madison County Medical Society has elected Dr. G. L. Loden, Colbert, President; Dr. R. J. Westbrook, Ila, Vice-President; Dr. W. D. Gholston, Danielsville, Secretary-Treasurer.

Tattnall County Medical Society has elected Dr. John M. Bowen, Cobbtown, President; Dr. J. C. Collins, Secretary-Treasurer.

The Tenth District Medical Society met at Louisville March 22.

The Georgia Health Officers Association met at Savannah May 8.

The Medical Societies of Brooks, Chatham, Cherokee, Pike, Taylor and Telfair Counties have adopted resolutions endorsing the movement on the part of the Masons of Georgia to build an institute at Alto for the care of tuberculous children.

The negro unit of Grady Hospital will be enlarged by the purchase of the old Atlanta Dental College property which has been recommended by the City Council.

The Clarke County Medical Society sponsored a medical institute at Athens, March 7-8.

The fifth annual tour of the State Board of Health's

(Continued on page 36)

Clinical Procedures
Taught with Motion Pictures

To learn a manual technic, the first essential step is to visualize it. Actual demonstration before the pupil serves this purpose—but it requires much valuable time of the instructor. Many times the single demonstration is not enough.

The motion picture can be used to supplement and often eliminate demonstrations. Such pictures can be shown as often as may be necessary. They visualize the technic.

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Bifocal wearers make constant use of the margins of their lenses. Tillyer bifocals will greatly benefit them.

New!
Tillyer Lenses
Accurate to the very edge

(Continued from page 34)

"Healthmobile" opened April 9 in Johnson County, and will close November 7 at DeKalb.

The Woman's Auxiliary to the Baldwin County Medical Society was organized April 4, Mrs. H. D. Allen, Sr. Milledgeville, was elected President; Mrs. Richard Binion, Milledgeville, Mrs. J. I. Garrard, Milledgeville, and Mrs. E. W. Allen, Milledgeville, Vice-Presidents; Mrs. John W. Mobley, Milledgeville, Corresponding Secretary; Mrs. Y. H. Yarbrough, Milledgeville, Recording Secretary.

A full-time health nurse has been employed by the Sumter County Board of Health to assist Dr. W. H. Houston, Americus, County Commissioner of Health.

Dr. George E. Atwood, Waycross, Health Officer for Ware County, recently held clinics for children of pre-school age at Millwood and Waresboro.

Dr. J. E. Penland, Waycross, was recently appointed Captain Surgeon for the Woodmen of the World.

Dr. W. P. Jordan, Columbus, has been elected Chairman of the Health Clinic Staff of that City.

Dr. Guy G. Lunsford, Weston, has recently been elected Health Officer for Crisp County.

Dr. Gordon T. Crozier, Health Officer for Valdosta and Lowndes County has been appointed on the medical staff of the Little Griffin Hospital, Valdosta.

Dr. Wm. J. Burdashaw, Augusta, has accepted an appointment at Wills Hospital, Philadelphia, Pa.

The following Georgians were elected to fellowship in the American College of Physicians at the meeting in New Orleans; Drs. E. Bates Block, James E. Paullin, H. C. Sauls, and Joseph Yampolsky, all of Atlanta; and Dr. William R. Houston, Augusta.

Dr. W. E. Person, Atlanta, has been elected President of the Alumni Association of Emory University to fill the unexpired term of the late Mr. Thos W. Connally.

Dr. Allen H. Bunce, Atlanta, has been appointed a member of the Committee on Legislation of the American Medical Editors' Association, by Dr. H. Lyon Hunt, New York, President.

Dr. William S. White has been elected Mayor of Fort Valley.

Dr. D. W. Register has been appointed full-time Health Commissioner of Moultrie.

Dr. R. G. Stephens has been elected a member of the Library Board of Atlanta.

Dr. William Tandy Randolph and Miss Martha Evelyn Patrick, both of Winder, were married on March 31.

Deaths

Dr. Henry Hagar Martin, Savannah, aged 60, died June 12.

Dr. Thomas Walter Reeves, Carrollton, aged 41, died April 7 at the Piedmont Hospital, Atlanta.

Dr. Warren Edgar Benson, Marietta, aged 41, died April 21 at a private sanitarium, Atlanta, of spinal meningitis.

Dr. John M. Crook, of Columbus, aged 80, died March 28 at Jacksonville, Ala., of bronchopneumonia.

Dr. Joaquin B. Arteaga, Atlanta, aged 28, died April 5, of spinal meningitis.

Dr. William Thomas Coggin, Athens, aged 57, died in February at Atlanta, as the result of an automobile accident which occurred about a year ago.

Dr. Samuel S. Gaulden, Quitman, aged 69, died at his home February 7 after an illness of more than two years.

KENTUCKY

Grant County Medical Society has elected Dr. C. M. Eckler, Williamstown, President; Dr. J. L. Price, Sherman, Vice-President; Dr. H. F. Mann, Crittenden, Secretary-Treasurer.

Oldham County Medical Society has elected Dr. H. B. Blaydes, La Grange, President; Dr. J. W. Sams, Crestwood, Vice-President; Dr. S. J. Smock, La Grange, Secretary.

Trigg County Court has made an appropriation of $1500 supplementary to appropriations from other sources, to secure a full-time health unit, which comprises a physician, nurse and sanitary officer. The Federal Government, the State and the Rockefeller Foundation will help defray the expenses.

The community hospital which will be erected near Glasgow, with the aid of the Commonwealth Fund,

(Continued on page 38)

An important recent development in infant feeding

The colloidal action of Knox Sparkling Gelatine is particularly desirable in the summer diet

THE colloid-chemical power of gelatine has been proved by Drs. Alexander, Bogue, Downey and other authorities. Gelatined milk is being used by many physicians and in many institutions. It is more easily digested and absorbed. It increases the available nourishment of the milk mixture. Because it prevents the formation of large curds, it helps overcome regurgitation and vomiting. It is useful in the diet of infants with curdy stools, diarrhea, constipation, colic or excessive gas formation.

In addition to its proved value in infant feeding, Knox Sparkling Gelatine is an important adjuvant in the diabetic diet, where it increases protein content and satisfies the craving of the patient for bulk in his food. In liquid and soft diets, Knox Sparkling Gelatine adds variety to the menu with dozens of dainty appetizing dishes.

For 40 years Knox Sparkling Gelatine has been our one standard product. From raw material to finished package, every process in its manufacture is subject to constant chemical and scientific control. Knox Sparkling Gelatine is all pure gelatine, unbleached, unflavored, free from sugar.

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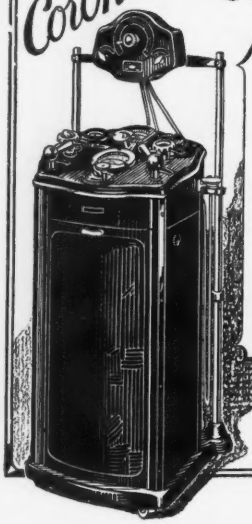

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(Continued from page 36)

New York, will be under construction in the near future. The community raised $73,000 and the Commonwealth Fund gave $180,000 for the building.

Deaths

Dr. Andrew J. Dixon, Pope, aged 76, died April 26.

Dr. Herman F. Whited, Owensboro, aged 49, died April 22 at the City Hospital, following an operation for appendicitis.

Dr. Flora W. Mastin, Lexington, aged 63, died April 19 of influenza and pneumonia.

Dr. Christopher G. Schott, Louisville, aged 51, died April 16.

Dr. John A. Stafford, Louisville, aged 65, died February 27.

Dr. James Rufus Duncan, Hopkinsville, aged 57, died April 19.

Dr. George H. Milligan, Roundhill, aged 82, died April 20.

Dr. Walter B. Jefferson, Hopkinsville, aged 86, died March 26 of pneumonia.

Dr. Andrew J. Alexander, Fulton, aged 71, died suddenly April 6 of cerebral hemorrhage.

Dr. John M. Chambers, Independence, aged 94, died March 19 of hypostatic pneumonia.

LOUISIANA

At the recent annual meeting of the Louisiana Dermatological Society, held at Baton Rouge, Dr. Ralph Hopkins, New Orleans, was elected President; Dr. O. E. Denny, Carville, Vice-President; Dr. T. A. Maxwell, New Orleans, Secretary-Treasurer.

The Community Chest and the Central Council of Social Agencies, New Orleans, sponsored a movement of the orthopedic surgeons to examine and diagnose the condition of all crippled children brought to the free central clinic on March 13-17. The object of this move is to bring to the attention of the residents of New Orleans the fact that the hospitals, when necessary, will give free treatment to indigent crippled children.

Dr. Aldo Castellani, Professor and Director of the Department of Tropical Medicine, Tulane University, School of Medicine, New Orleans, recently completed a series of lectures on tropical medicine in Madrid, Spain, under the auspices of the Royal Academy of Madrid at the invitation of the Queen of Spain.

Dr. Laurence R. DeBuys, New Orleans, won the silver loving cup at the annual medical golf tournament, held during the recent meeting of the State Medical Association in Baton Rouge.

Dr. James Phares O'Kelley has been elected President of the New Orleans Country Club.

Deaths

Dr. Guy Cecil Pardue, Mangham, aged 46, died April 19.

Dr. William Fred Hagaman, Baton Rouge, aged 67, died April 6 of paralysis agitans.

Dr. Clarence David Edgar, Jr., Forest Hill, aged 26, died December 22, of tuberculosis.

Dr. Frederick Turney, New Orleans, aged 62, died February 16.

MARYLAND

The Medical and Chirurgical Faculty of Maryland, at its annual meeting in April, elected Dr. Alexius McGlannan, Baltimore, President; Drs. Henry M. Fitzhugh, Westminster, Robert P. Bay and Thomas R. Boggs, both of Baltimore, Vice-Presidents; Dr. John T. King, Jr., Baltimore, Secretary; Dr. Charles E. Brack, Baltimore, Treasurer.

The annual conference of Health Officers and Board of Health of Maryland was held at Baltimore April 26-28.

Dr. John S. Fulton, upon retirement from active service as Director of Health of Maryland, was appointed Director Emeritus. He is succeeded by Robert H. Riley, who has been serving as Deputy State Health Officer since 1914.

Dr. George Barger, Professor of Chemistry in relation to medicine in the University of Edinburgh, gave the Charles E. Dohme Memorial Lectures from May 7-9 at the Johns Hopkins University School of Medicine, Baltimore.

Dr. Dean Lewis, Surgeon-in-chief, Johns Hopkins

(Continued on page 40)

AMERICAN

HAYFEVER

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for Diagnosis and Treatment

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GRASS HAYFEVER begins about the time *tree hayfever* ends, *viz.* May 15th, and need not be confused with the earlier appearing and sometimes overlapping tree hayfever.

WEED HAYFEVER—August to frost—is unrelated to the previously occurring *grass hayfever* and is occasioned, according to the locality, by such late pollinating plants as the Ragweeds—Russian Thistle—Western Water Hemp—Carelessweed—or Sage Brush.

LIST of pollens for any section—any season—with commentary circular discussing the treatment of hayfever by *preseasonal* or *coseasonal* method, with respective schedules of dosage—sent on request.

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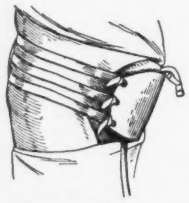

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Cardiac Diseases

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RAHWAY NEW JERSEY

(Continued from page 38)

Hospital, has been made a foreign member of the Societa Medico-Chirurgica of Bologna and an Ausserordentliches Mitglied der deutschen Gesellschaft, fur Chirurgie.

Dr. Francis D. Coman, Assistant Resident Surgeon, Johns Hopkins Hospital, Baltimore, has been selected as Medical Officer to accompany the expedition of Commander Byrd to the South Pole. He expects to be away about three years and will go as a representative of Johns Hopkins University School of Medicine.

Dr. Lawson G. Lowrey, Director, Institute of Child Guidance, New York, gave one of the De Lamar lectures at the School of Hygiene and Public Health of Johns Hopkins University, April 3, on "Child Study Work."

Dr. Benjamin Miller and Miss Goldie Kirson, both of Baltimore, were married March 11.

Deaths

Dr. Robert Kemp Jefferson, Federalsburg, aged 59, died January 3 of angina pectoris.

Dr. Augustine Palmisano, Baltimore, aged 51, died April 27 at the University Hospital.

Dr. Howard Nason Freeman, Baltimore, aged 45, died April 1.

Dr. William Ridgley Martin, North Baltimore, aged 88, died April 20 of arteriosclerosis.

MISSISSIPPI

Dr. T. Paul Haney has accepted the position as full-time County Health Officer of Tishomingo County, and will be located at Iuka.

At the sixty-first annual meeting of the Mississippi State Medical Association, held in Meridian, May 8-10, the following officers were elected: Dr. William H. Frizell, Brookhaven, President; Drs. James H. Rush, Meridian, Thomas W. Reagan, Union, and Theophilus E. Ross, Jr., Hattiesburg, Vice-presidents; Dr. Thomas M. Dye, Clarksdale, reelected Secretary. The next meeting will be held at Gulfport.

Dr. Hugh L. McCalip has been appointed Health Officer of Yazoo County. He succeeds Dr. William W. Nesbit, the U. S. Public Health Service.

Dr. J. A. Rayburn, Ecru, has been appointed Superintendent of the Natchez Hospital, succeeding Dr. J. C. McNair.

Dr. A. J. Podesta succeeds Dr. Sidney Johnson as Superintendent of the State Charity Hospital in Vicksburg.

Dr. Robert J. Enochs is Superintendent of the new twenty-five bed government hospital for the Choctaw Indians at Philadelphia, which opened April 14.

Drs. C. D. Barkley and Wm. F. Hand announce the recent opening of a twenty-five bed infirmary at State Line.

Dr. J. T. Googe, Clarke County, has been selected as the Lauderdale County Health Officer.

Deaths

Dr. William Wesley Boyd, West Point, aged 74, died February 28 of arteriosclerosis.

Dr. Lewis Elmer Pierce, Clarksdale, aged 49, died April 20 in Memphis, of injuries received when the automobile in which he was driving was struck by a train.

Dr. Joseph A. Tabor, Pascagoula, aged 57, died March 7 in an infirmary in Atlanta, Ga.

MISSOURI

Daviess County Medical Society has elected Dr. J. D. Dunham, Pattonsburg, President; Dr. J. L. Reich, Altamont, Vice-President; Dr. M. A. Smith, Gallatin, Secretary-Treasurer.

Howell-Oregon-Texas Medical Society was organized at West Plains, February 10. The following officers were elected: Dr. R. E. Hogan, West Plains, President; Dr. Joseph L. Eblen, Alton, and L. M. Edens, Cabook, Vice-Presidents; Dr. P. D. Gum, West Plains, Secretary-Treasurer.

Laclede County Medical Society has elected Dr. William O. Pool, Stoutland, President; Dr. T. B. Herbert, Lebanon, Vice-President; Dr. J. M. Billings, Lebanon, Secretary-Treasurer.

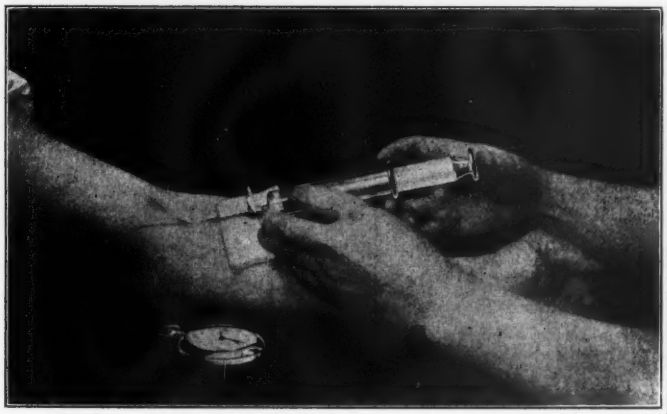
Lawrence-Stone County Medical Society has elec-

(Continued on page 42)

ESSENTIAL FACTORS

in the

Arsenical Treatment of Syphilis



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(Continued from page 40)

ted Dr. W. J. Bryan, Mt. Vernon, President; Dr. T. D. Miller, Aurora, Vice-President; Dr. R. D. Cowan, Aurora, Secretary-Treasurer.

The Southern Society for Clinical Surgeons which held its second annual meeting in St. Louis, in April, elected the following officers: Dr. J. A. Crisler, Jr., Memphis, Tenn., President; Dr. John C. Burch, Nashville, Tenn., Vice-President; Dr. John S. Horsley, Jr., Richmond, Va., re-elected Secretary-Treasurer; Dr. Carrington Williams, Richmond, Va., a member of the Council.

Surgeons from various cities in the United States gathered at St. Louis, January 30-February 2, for a four day clinical meeting arranged by Dr. Evarts A. Graham, Professor of Surgery, Washington University School of Medicine.

The first annual "Presidents' Night" of the St. Louis Medical Society was inaugurated April 10, with Dr. William Allen Pusey, Chicago, Ex-President of the American Medical Association, as the speaker.

The Western Association of Physical Therapy held its tenth annual meeting at Kansas City, April 20-21. The following officers were elected: Dr. E. N. Kime, Indianapolis, Ind., President; Dr. W. P. Grimes, Kansas City, and Dr. A. F. Tyler, Omaha, Neb., Vice-Presidents; Dr. Charles Wood Fassett, Kansas City, Secretary; Dr. F. L. Laffoon, Kansas City, Treasurer; Dr. J. T. Stamey, St. Joseph, Registrar; Drs. J. E. G. Waddington, Detroit, Mich., and F. H. Morse, Boston, Mass., Trustees.

The St. Louis Baptist Hospital has arranged to purchase the old St. Louis Maternity Hospital, for about $70,000, and the erection of a new building is being considered.

St. Louis County has appropriated $100,000 to purchase a site for the St. Louis County General Hospital, for which the citizens recently voted a million dollar bond issue.

St. Elizabeth's Hospital, Hannibal, is constructing an $80,000 annex.

The surgical capacity of Barnes Hospital, St. Louis, is to be doubled by a $750,000 gift to the Washington University School of Medicine, from Frank C. Rand and Jackson Johnson, St. Louis, President and Chairman, respectively, of the Board of the International Shoe Company, and the General Education Board. The General Education Board gave $450,000 for the medical school activities; the shoe manufacturers gave $150,000 each to provide the quarters, a three-story addition to the present three-story pavilion of Barnes Hospital, which is affiliated with the School of Medicine. Mr. Rand's gift is in memory of his brother, Edgar E. Rand, who died in 1907, one of the pioneers who made St. Louis the leading city of the country in the shoe industry. Mr. Jackson dedicated his contribution to his son, Jackson Johnson, Jr., who died overseas with the A. E. F. in 1918. The hospital, with the addition, will have 200 surgical beds.

Dr. Philip Frank has been appointed Associate Otolaryngologist to the Jewish Hospital, St. Louis.

Mrs. Essie Ingram Hood has been appointed Superintendent of the Springfield Baptist Hospital, Springfield, to succeed Margaret Young.

Dr. Joseph William Larimore, St. Louis, and Miss Ruth Evans, Fort Valley, Ga., were married March 1.

Deaths

Dr. Edwin Hume, Kansas City, aged 58, was killed April 13, when he fell down a seventy foot staircase.

Dr. William Thomas Jefferson Bailey, Cassville, aged 58, died April 2 in a hospital at Sulphur, Okla., of heart disease.

Dr. Nelson Erwin Peck, Winchester, aged 63, died April 13 of scarlet fever.

Dr. William Braxton Winn, St. Louis, aged 71, died April 17.

Dr. James Elmore Logan, Kansas City, aged 66, died March 24 of chronic cardiovascular disease.

Dr. Charles Newton Hahn, Humansville, aged 45, died March 17 at St. John's Hospital, Springfield, of diphtheria, complicated by encephalitis.

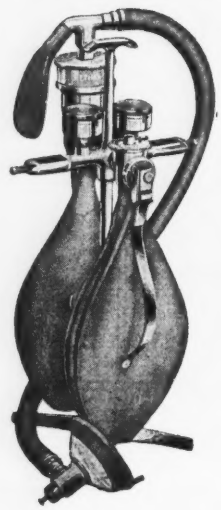
Dr. Alfred L. Goodwin, Kansas City, aged 78, died March 7 of auricular fibrillation and cirrhosis of the liver.

Dr. William A. Swan, Kansas City, aged 45, died January 25 of myocarditis.

Dr. James Joseph Barry, Owensville, aged 42, was

(Continued on page 44)

McKESSON SPECIAL NO. 306



This little apparatus is designed particularly for obstetrics and those ordinary minor operations requiring a short anesthesia in the office or home. For analgesia in obstetrics it is wonderfully efficient, though small and sturdy for automobile transportation.

The advantages of nitrous oxid-oxygen analgesia and anesthesia are fully attained with this apparatus.

The intermittent flow principle is available with this little outfit which makes it so simple to use, prevents any waste of gases when the inhaler is removed from the face, and maintains the supply of gases ready for instantaneous inhalation at the very moment when uterine contraction begins, which are the essentials to successful analgesia.

The whole apparatus, (without tanks) is contained in a beautifully finished solid mahogany carrying case 9 x 9 x 16 inches and weighs only about 15 pounds. A case 9 x 9 x 23 to carry apparatus and tanks is furnished on special order only.

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EVERY WOUND IS
a potential field for TETANUS
. . . *yet it is so easily prevented*

THE APPROACH OF SUMMER with its increased outdoor activity and its consequent dangers from infection with tetanus makes it advisable to have on hand one or two packages of Tetanus Antitoxin Squibb.

All breaks in the continuity of the skin, especially when deep, are well-known to be excellent media for the growth of the anaerobic tetanus bacillus. On the battlefields in France every wound, no matter how trivial, was considered a potential tetanus infection and the individual was immunized against tetanus by the use of antitoxin. This immunization practically eliminated tetanus in the World War.

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Tetanus Antitoxin Squibb is small in bulk, high in potency, low in total solids, yet of a fluidity that permits rapid absorption. It is remarkably free from serum-reaction producing proteins. Tetanus Antitoxin Squibb is supplied in vials or syringes containing an immunizing dose of 1500 units. Curative doses are marketed in syringes containing 3,000, 5,000, 10,000 and 20,000 units.

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MANUFACTURING CHEMISTS TO THE MEDICAL PROFESSION SINCE 1858.

(Continued from page 42)

found dead April 5 of shock, following an automobile accident.

Dr. Philip H. Barth, Bismarch, aged 49, died March 2.

Dr. Henry Wilson Malony, Buckner, aged 58, died February 16 of gastric ulcer.

Dr. Thomas Howard Hudson, Kansas City, aged 80, died March 27 of cerebral hemorrhage.

Dr. Warren Clark Patton, Cape Girardeau, aged 69, died March 22 of myocarditis and nephritis.

NORTH CAROLINA

At the recent annual meeting of the North Carolina State Medical Association held at Pinehurst the following officers were elected: Dr. Thurman D. Kitchin, Wake Forest, President; Drs. W. L. Dunn, Asheville; D. T. Taylor, Jr., Washington, and W. D. James, Hamlet, Vice-Presidents; Dr. L. B. McBrayer, Southern Pines, Secretary-Treasurer.

A Memorial Service for Dr. William A. Johnson, formerly Professor of Anatomy in the Wake Forest Medical School, who was accidentally killed last November, was held at the College on April 26.

Drs. C. C. Joyner, D. S. Morrill and John S. Hooker, Farmville, have formed a clinic.

Drs. Charles S. and Russell L. Norburn, Asheville, announce that they will soon open a twenty bed hospital for surgical patients. Miss Violet McGill, formerly Assistant Superintendent of Biltmore Hospital, and for the past few years in charge of a hospital in Florida, will be Superintendent.

A modern fireproof 100 bed hospital will be erected soon at Raleigh, through the generosity of Edward Monroe Harris, Philadelphia, Pa., native North Carolinian, as a memorial to his father, Joseph A. Harris. It will be a general hospital for both charity and pay patients and will be conducted without profit. It will be in the hands of a board of trustees and will be supported by an endowment.

Dr. Charles R. Reaves has been elected President of the Medical Arts Club, Greensboro.

Dr. and Mrs. Samuel H. Cannady, Oxford, recently presented the Baptist Church of that city with a $10,000 organ for the new edifice.

Dr. Cyrus J. McCombs, Gastonia, was recently elected full time Health Officer for Gaston County.

Deaths

Dr. William LeRoy Dunn, Asheville, aged 57, died May 24 in a hospital at Washington, D. C., of cancer of the lungs.

Dr. Elijah Fillmore Bingham, Amantha, aged 72, died March 26 of influenza.

Dr. Neill MacRae, Littleton, aged 50, died April 14 of pneumonia.

Dr. John M. Belk, Monroe, aged 63, died March 21 of heart disease.

Dr. Carl Putnam Parker, Seaboard, aged 36, died April 6 of angina pectoris.

Dr. Benjamin R. Graham, Wilmington, aged 61, died April 18 of septicemia.

OKLAHOMA

The film "Infection of the Hand" was shown at the March 24 meeting of the Oklahoma County Medical Society and at other meetings throughout the State to determine whether the profession is interested in having the University secure the film library, covering fifty-five different subjects, and costing about $8,000.

(Continued on page 46)

KLIM—*the perfect Milk for Travel*

In addition to WHOLE Milk Merrell-Soule offers:

POWDERED PROTEIN MILK

This is the dehydrated equivalent of Finkelstein's original Eiweissmilch. Sustained pediatric recognition and approval testify to the fact that Merrell-Soule Powdered Protein Milk has a definite place in infant feeding.

POWDERED WHOLE LACTIC ACID MILK

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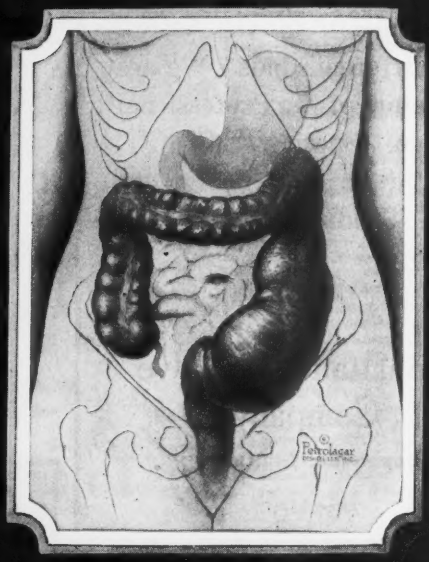

The above picture is one of a series illustrating the Seventh Edition of the treatise "Habit Time" (of bowel movement).

Separate enlargements of this engraving and "Habit Time" mailed free to physicians on request.

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Normal peristalsis is more easily restored when proper fecal consistency is maintained. Authorities who study atonic constipation urge the importance of aiding weakened and distended muscles in their efforts to effect elimination.

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—is an emulsion of 65% mineral oil and agar agar in which the oil is held in very small particles, permitting even diffusion with intestinal contents.

Petrolagar with Phenolphthalein, No. 2 (red label), in which there is a phenolphthalein content of 32/100 of 1%, is preferred by many physicians in the beginning treatment of obstinate constipation cases.

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NEW ORLEANS, LA.

(Continued from page 44)

If secured, the films would be loaned to medical societies, together with a skilled operator furnished by the extension department of the University.

The Garabedian Clinic for Children, Tulsa, announces the addition of Dr. Harry J. McGuire, Chicago, Illinois, to the staff.

Deaths

Dr. Henry A. Conger, Duncan, aged 67, died suddenly in March.

Dr. Daniel A. Iliff, Muskogee, aged 72, died March 25 of myocarditis.

SOUTH CAROLINA

The South Carolina Society of Ophthalmology and Oto-Laryngology held its business meeting at Columbia, April 18. The following officers were elected: Dr. Clarence Kibler, Columbia, President; Dr. George Truluck, Orangeburg, Vice-President; Dr. Walter Bristow, Columbia, Secretary-Treasurer.

Deaths

Dr. William Jackson Chapman, Inman, aged 74, died March 1.

Dr. John Wesley Young, Clinton, aged 84, died May 2 of apoplexy.

Dr. J. F. Kinney, Bennettsville, aged 56, died April 21 of cerebral embolism.

TENNESSEE

St. Joseph's Hospital, Memphis, announces the appointment of Dr. J. A. McIntosh, as Director of the

(Continued on page 48)

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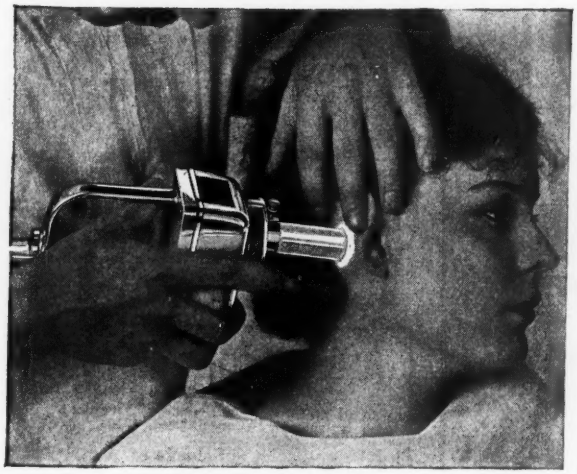

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"Ultra-violet light from the air-cooled mercury vapor quartz lamp is a specific in tetany, rickets, and spasmophilia, and is very valuable as a general tonic in depressed bodily states such as anorexia and some cases of anemia, and in poor nutrition . . ." The Atlantic Medical Journal, Vol. XXXI, No. 8, May, 1928, pages 537-542.

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If there were no other advantages in the *Kromayer Lamp*—if the mechanical excellencies that make for scientific precision and utmost convenience were eliminated — there would still remain one strong reason for its use — the *Hanovia* Burner.

This burner is of the entire quartz mercury anode type, and is manufactured completely by Hanovia.

Each burner must pass a rigid test in the Hanovia laboratories, to insure the highest intensity and the longest service.

The economy of the *Hanovia* Burner is apparent in its low consumption of current.

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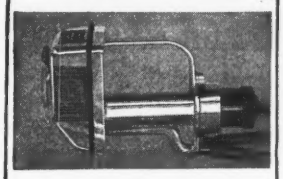

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(Continued from page 46)

Clinical Laboratories and Pathologist to succeed Dr. J. F. Hamilton.

The director of regulatory work of the U. S. Department of Agriculture has announced that Dr. James J. Durrett, Memphis, is to be in charge of drug control in the food, drug and insecticide administration. He will succeed Dr. George W. Hoover, who resigned to engage in private practice.

Dr. Eugene Davis, formerly in charge of a Veterans' Bureau Hospital in New Orleans, Louisiana, has assumed charge of the U. S. Veterans Bureau Hospital, No. 88, Memphis.

Dr. Victor H. Bean has been made physician of Beverly Hills Sanatorium, Knoxville, succeeding Dr. E. A. Patton who has gone to Kentucky.

Dr. Reese Patterson, Knoxville, recently held a clinic at Maryville for crippled children.

(Continued on page 50)

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Medical College of Virginia
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Psylla

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Battle Creek Dept. S.M.7 Michigan

(Continued from page 48)

Deaths

Dr. W. E. Whitley, Gordonville, aged 81, died February 26.

Dr. Paul A. Neal, Westpoint, aged 65, died November 18 of myocarditis.

Dr. J. T. Bomar, Mansfield, aged 65, died April 6 of cerebral hemorrhage.

Dr. Archie Byrd, Wartburg, aged 47, died suddenly April 30.

Dr. Young L. Abernathy, Chattanooga, aged 82, died April 2 of myocarditis.

Dr. Andrew Newton Hollabaugh, Nashville, aged 51, died suddenly April 13 of angina pectoris.

Dr. William Alonzo Barger, Statesville, aged 76, died in March of valvular heart disease.

Dr. Benjamin T. Bondurant, Sharon, aged 81, died March 17 of pulmonary tuberculosis and cerebral hemorrhage.

Dr. Edgar Hamilton Byrd, Chattanooga, aged 66, died April 10 of carcinoma of the liver.

CLASSIFIED ADVERTISEMENTS

ATTENTION SURGEONS AND DOCTORS wanting good location and sanitarium. For sale at once well built three-story brick forty-room furnished commercial hotel for less than half value. Time ripe for it to be turned quickly into a hotel sanitarium. Not even a city hospital here and no sanitarium in hundred miles. Population about 8000, backed by a thickly populated country. Large cotton mills, large silk mills and large granite mines. Many expert workers and every one else including doctors begging for a sanitarium to be opened here. Elberton is in the heart of the Piedmont Section, Northeast Georgia. Finest all the year round climate in the South. Three railroads, junction of several through highways. Too many hotels here and no hospital. Write or see D. Sheppard, Agent, Hotel Gholston, Elberton, Ga.

TECHNICIAN—Laboratory and X-Ray. Young woman desires position in hospital or physician's office. Protestant. One year's experience in well-known hospital. Capable of taking responsibility. P. E. R., care Journal.

FOR SALE, to thoroughly trained eye, ear, nose and throat surgeon, half interest in my equipment, accounts and established twenty thousand dollar eye, ear, nose and throat practice, which can with a good man be increased to thirty thousand. Will sell for fifteen thousand dollars, half of which must be cash. Located in city of forty thousand with excellent hospital facilities. One million people within one hundred miles. Roads excellent. Most progressive state in South. E. M. G., care Southern Medical Journal.

TO THE MEDICAL PROFESSION: We are filling a long-felt want by conducting a training class teaching blood counts, urinalyses, sputum and feces examinations; also basal metabolism readings. We will gladly furnish you with competent office assistants trained in such laboratory procedures as you may require. Our classes are made up of stenographers, bookkeepers, registered nurses and clerks. Send us your office assistant for training. Write or telephone for full information. Dial 3-3598. John V. Mix, Director, Alabama Pathological Laboratory, 1005 Martin Building, Birmingham, Ala.

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TEXAS

Panhandle District Medical Society met at Amarillo April 10-11. The following officers were elected: Dr. A. F. Lumpkin, Amarillo, President-Elect: Dr. T. D. Frizzell, Quanah, Vice-President; Dr. J. J. Crume, Amarillo, Secretary-Treasurer.

The annual meeting of the Board of Directors of the Texas Public Health Association was held in Fort Worth, April 16. The following officers were elected: Dr. J. D. Finnegan, Kingsville, President; Dr. J. B. Rawlings, El Paso, and Dr. John W. Everman, Dallas, Vice-Presidents; Dr. W. C. Farmer, San Antonio, Secretary; Dr. H. A. Wroe, Austin, Treasurer.

Texas Surgical Society met in Fort Worth, April 9-10.

On March 27, the County Commissioners officially endorsed a plan submitted by a committee from the El Paso County Medical Society to have every cow in the County inspected for tuberculosis.

Dr. E. O. Rushing has purchased the old Samuell homestead, Dallas, for the purpose of erecting a clinic building and sanatorium. The estimated cost of the proposed building is $125,000.

A contract has been let for extensive improvements in the Plainview Sanitarium, consisting of installation of a new heating plant and signal system, together with the construction of an addition to the sanitarium. The estimated cost of the completed work is about $40,000.

Drs. A. A. Nelson, George Barham and C. T. Smith, Nacogdoches, have reopened the North Street Hospital in order to furnish hospital care for patients until the Municipal Hospital for the City is finished.

The Board of Regents of the University of Texas has elected Dr. George Emmett Bethel, Director of the University Health Service, as Dean of the State Medical College, Galveston, effective September 1, to fill the vacancy caused by the resignation of Dr. Henry Hartman.

Dr. J. H. Crouch, recently with the Health Department of Fort Worth, has accepted the position of State Epidemiologist of Montana, with headquarters at Helena, Mont.

(Continued on page 52)

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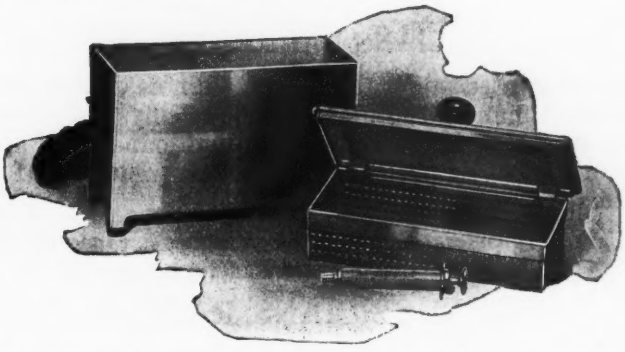

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(Continued from page 50)

Dr. D. R. Venable, until recently a pathologist in Terrell's Laboratory, Forth Worth, is located at Tulsa, Okla., where he is in charge of Terrell's Laboratories in that City.

Fleda Ezzell has been appointed Superintendent of the City-County Hospital, Granger, succeeding Grace Stewart who resigned recently.

Dr. W. A. Davis, formerly of the Health Department of Fort Worth, has been appointed Director of the Bureau of Vital Statistics.

Dr. Charles Earl Kitchens, Texarkana, and Miss Edith Brevard Hayes, Nashville, Tenn., were married March 15.

Deaths

Dr. Frank L. Ramsey, Garland, aged 69, died suddenly April 21 of cerebral hemorrhage.

Dr. George W. Carter, Abilene, aged 75, died April 2.

Dr. John Rankin Alford, Hico, aged 94, died April 1.

Dr. W. Claude Moore, Alpine, aged 53, died in the Masonic Hospital, El Paso, March 20.

Dr. Thomas Forest Whiteside, Timpson, aged 53, died March 30 of heart disease.

Dr. Eldred Allany Davis, Mineral Wells, aged 47, died suddenly April 7 of injuries received in a fire.

Dr. Sidney Renford Crabtree, Mount Pleasant, aged 61, died March 25 of heart disease and chronic nephritis.

Dr. Josephus B. McMahon, El Paso, aged 67, died March 30 at a hospital in Baton Rouge, La., of heart disease.

Dr. James S. Stidham, Campbell, aged 77, died March 30 of uremia.

VIRGINIA

The Virginia Society of Oto-Laryngology and Ophthalmology held its ninth annual meeting at Newport News in May. Dr. Frank Hanger, Staunton, was elected President; Dr. James Morrison, Lynchburg, Vice-

(Continued on page 54)

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(Continued from page 52)

President; Dr. Fletcher D. Woodward, University, re-elected Secretary-Treasurer. The next meeting will be held at Staunton in May 1929.

Post-graduate clinics were held at the University of Virginia Hospital for three days the middle of April.

The building at 613 West Grace Street, used as one of the nurses' homes of St. Elizabeth's Hospital, will be turned into an annex of the Hospital. The building at 609 West Grace Street has been purchased and will be made into a large nurses' home. Radio service with ear phone connections has recently been installed in the hospital.

The Accomack-Northampton Hospital, Nassawadox, Northampton County, will be opened during the summer.

Dr. Russell L. Cecil, New York, N. Y., delivered the commencement address at the Medical College of Virginia, Richmond, May 29. Dr. Cecil is an alumnus of the College and the honorary degree of doctor of science was conferred upon him.

Dr. Alexander F. Robertson, Jr., Staunton, has been appointed as a member of the State Board of Medical Examiners to fill the vacancy caused by the death of Dr. Robert Glasgow, for the unexpired term of four years ending April 1, 1930.

Dr. Francis Lee Thurman, Buena Vista, has been elected President of the Buena Vista Rotary Club.

Dr. William Painter Gilmer, Clifton Forge, and Miss Helen Newman, Corinth, Miss., were married February 8.

Deaths

Dr. William Patterson Isley, Hampton, aged 55, died April 22.

Dr. Nathaniel S. Smith, Chincoteague Island, aged 86, died April 3 of chronic valvular heart disease.

(Continued on page 56)

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(Continued from page 54)

Dr. Martin P. Dillard, Henry, aged 75, died February 26 at Rocky Mount of heart disease.

WEST VIRGINIA

At the recent anual meeting of the West Virginia State Medical Association at Fairmont, the following officers were elected: Dr. H. M. Hall, Wheeling, President; Drs. J. A. Duff, Martinsburg, W. C. Swann, Huntington, and B. F. Bone, Moundsville, Vice-Presidents; Dr. T. M. Barber, Charleston, Treasurer. The next meeting will be held at Martinsburg.

Wayne County Medical Society was recently organized. Dr. W. F. Bruns, Caredo, was elected President; Drs. A. G. Wilkinson, Wayne, and Roscoe Stotts, Kenova, Vice-Presidents; Dr. J. W. Ferguson, Kenova, Secretary-Treasurer. The Society was originally organized in 1918, but because of bad roads over most of the county and the difficulties to travel was discontinued after one year. Hard roads have replaced those that were formerly graded; and graded roads have replaced muddy lanes.

Dr. E. C. Wade, Bluefield, has been elected President of the Bluefield Rotary Club and Dr. Albert H. Hoge, Bluefield, Vice-President.

Dr. H. F. Spillers, Wheeling, has resigned as President of the Hospital Association of West Virginia. He has been succeeded by Dr. L. W. Lawson, Logan.

Dr. C. E. Gabel, former Director of the Laboratory of the West Virginia State Health Department, has returned from Texas and has opened a laboratory of his own in Charleston.

Deaths

Dr. David Hott, Morgantown, aged 55, died May 20 in a Hospital at Denver, Colo., following a long illness.

Dr. John S. Offnutt, Capon Bridge, aged 64, died April 2 in a Hospital at Baltimore, following an operation for gallstones.

Dr. Thomas Edward Peery, Bluefield, aged 54, died March 26 of chronic nephritis, hypertension and cerebral softening.

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